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STATE OF CALIFORNIA  
DEPARTMENT OF NATURAL RESOURCES  
GEORGE D. NORDENHOLT, Director

DIVISION OF MINES  
FERRY BUILDING, SAN FRANCISCO

WALTER W. BRADLEY

State Mineralogist

San Francisco]

BULLETIN No. 114

[Sept. 1937

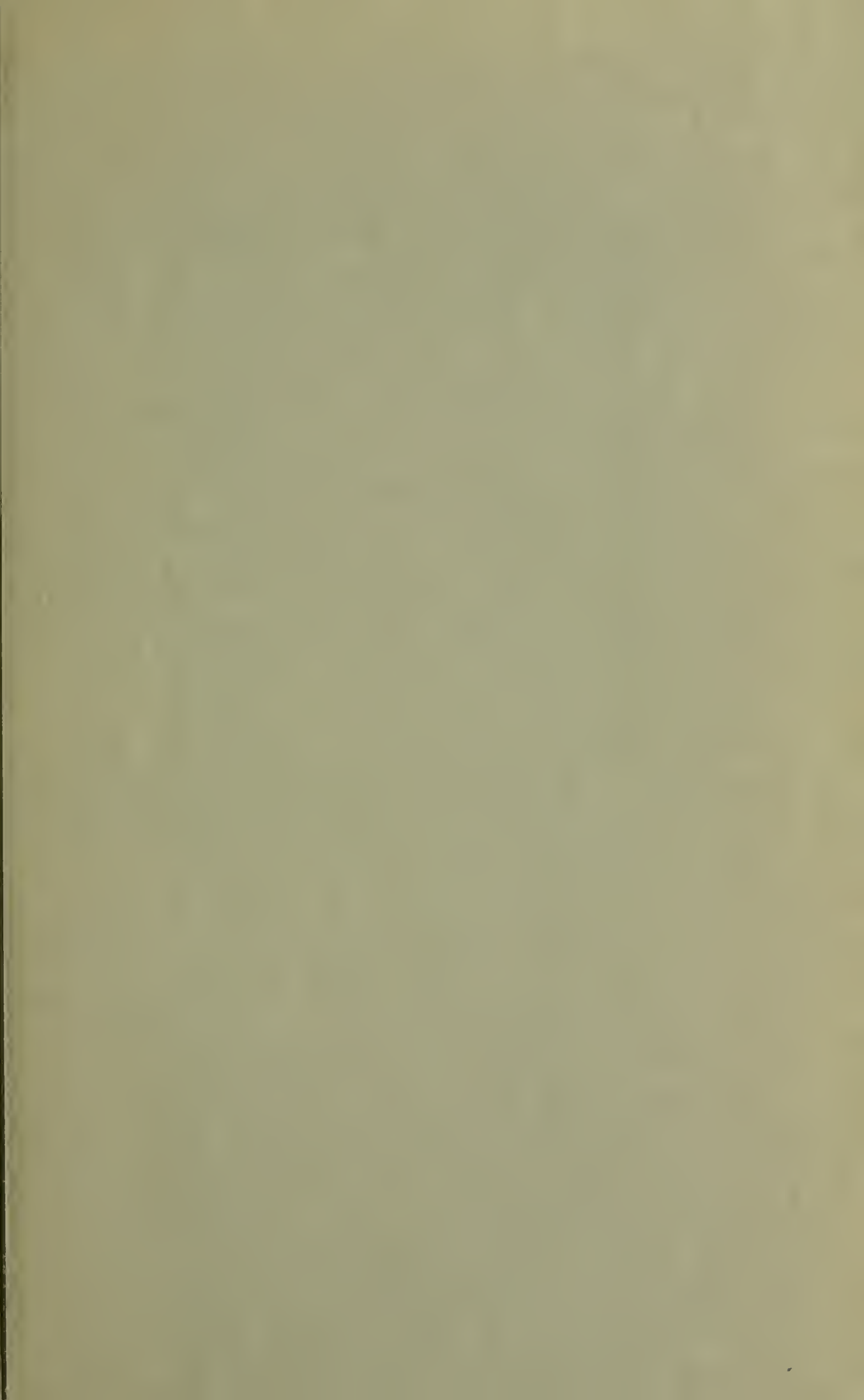
CALIFORNIA  
MINERAL PRODUCTION  
AND  
DIRECTORY OF MINERAL PRODUCERS  
FOR 1936



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FOR 1936

By  
HENRY H. SYMONS



CALIFORNIA STATE PRINTING OFFICE  
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## LETTER OF TRANSMITTAL

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September, 1937

*To His Excellency, THE HONORABLE FRANK F. MERRIAM,  
Governor of the State of California.*

SIR: I have the honor to herewith transmit Bulletin No. 114 of the Division of Mines, of the Department of Natural Resources, being the annual report of the statistics of the mineral production of California.

The remarkable variety, total values, and wide distribution of many of our minerals revealed herein show California's importance as a producer of commercial minerals among the states of the Union.

Respectfully submitted.

GEORGE D. NORDENHOLT,  
Director, Department of Natural Resources.





## INTRODUCTION

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It is the endeavor of the staff of the State Division of Mines (formerly State Mining Bureau), in these annual reports of the mineral industries of California, to so compile the statistics of production that they will be of actual use to producers and to those interested in the utilization of the mineral products of our State, while at the same time keeping the individual's data confidential. In addition to the mere figures of output, we have included descriptions of the uses and characteristics of many of the materials, as well as a brief mention of their occurrences.

The compilation of accurate and dependable figures is an extremely difficult undertaking, and the State Mineralogist takes the opportunity of here expressing his appreciation of the cooperation of the producers in making this work possible. A fuller appreciation of the value of early responses to the requests sent out in January will result in earlier completion of the manuscript. Statistics lose much of their value if their publication is unnecessarily delayed.

Some of the data relative to properties and uses of many of the minerals herein described are repeated from preceding reports, as it is intended that this annual statistical bulletin shall be somewhat of a compendium of information on California's commercial minerals and their utilization.

WALTER W. BRADLEY,  
State Mineralogist.



# MINERAL INDUSTRY, CALIFORNIA, 1936

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## DATA COMPILED FROM DIRECT RETURNS FROM PRODUCERS IN ANSWER TO INQUIRIES SENT OUT BY THE CALIFORNIA STATE DIVISION OF MINES, FERRY BUILDING, SAN FRANCISCO, CALIFORNIA

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### CHAPTER ONE

The total value for the mineral output for California for the year 1936 was \$327,804,268, being an increase of \$64,399,951 over the total of 1935 which was \$263,404,317. There were fifty-eight different mineral substances, exclusive of a segregation of the various stones grouped under gems; and all fifty-eight counties of the state contributed to the list.

As revealed by the data following, the salient features of 1936 compared with the previous year, were: All groups such as fuels, metals, structural materials, industrial minerals, and salines show a marked increase in total value. Of the individual mineral products petroleum showed the greatest increase in value and output followed in turn by miscellaneous stone, cement, gold, borates, potash, natural gas, silver, brick and hollow building tile, soapstone and talc, granite, silica. Those showing decreases in total value were coal, chromite, mineral water, salt, sandstone.

Of the fuels, petroleum showed an increase in value of \$32,331,874 and an increase in amount from 205,979,855 barrels to 214,776,227 barrels of crude oil. The average price received for all grades of crude oil was an increase over that received in 1935. Natural gas showed an increase in value with a slight decrease in amount from 302,447,193 M cu. ft. worth \$17,680,661 to 298,922,708 M cu. ft. valued at \$18,585,970.

Of the metals, the gold output increased from 980,430 fine ounces to 1,077,442 fine ounces and in value from \$31,165,050 to \$37,710,470. Silver increased from 1,191,112 fine ounces worth \$856,112 to 2,103,799 fine ounces worth \$1,629,392; copper from 2,031,836 lbs. worth \$168,645 to 9,991,799 lbs. worth \$919,245, with quicksilver, lead, tungsten, and iron also showing increased value, zinc and chromite being the only metals to show decreased values.

Of the structural materials, cement increased in amount and value from 8,086,292 barrels worth \$10,120,721 to 13,300,188 barrels worth \$18,314,589; miscellaneous stone from a total value of \$5,571,041 to \$16,575,238; brick and hollow building tile from a value of \$1,855,343 to \$2,240,905. Increases were also registered by granite, lime, marble (onyx and travertine), and slate. Magnesite and sandstone showed decreases in value.

In the industrial group, the total value increased from \$4,618,588 to \$5,236,534 and with most of the important mineral products therein showing increases. Noteworthy were pumice and volcanic ash, silica, talc and soapstone. Decreases were registered by barite, mineral water, and pyrite.

The total value of the saline group increased from \$9,700,802 to \$12,416,349 with all the larger products showing an increased value with the exception of salt.

#### By Substances.

The following table shows the comparative yield of mineral substances of California for 1935 and 1936, as compiled from the returns received at the State Division of Mines, San Francisco, in answer to inquiry sent to producers:

Substance	1935		1936		Increase + Decrease— Value
	Amount	Value	Amount	Value	
Barite.....	22,979 tons	\$133,810	*	*	*
Bentonite (fuller's earth).....	10,204 tons	68,372	10,185 tons	\$165,131	\$96,759+
Borax.....	280,249 tons	4,602,064	313,389 tons	5,911,093	1,309,029+
Brick & hollow building tile.....		1,855,343		2,240,905	385,562+
Cement.....	8,086,292 bbls.	10,120,721	13,300,188 bbls.	18,314,589	8,193,868+
Chromite.....	523 tons	6,111	221 tons	3,314	2,797—
Clay (pottery).....	240,014 tons	377,969	382,823 tons	646,920	268,951+
Coal.....	8,049 tons	32,745	370 tons	1,815	30,930—
Copper.....	2,031,836 lbs.	168,645	9,991,799 lbs.	919,245	750,600+
Feldspar.....	*	*	3,430 tons	24,959	*
Gems.....		945		2,878	1,933+
Gold.....	890,430 fine ozs.	31,165,050	1,077,442 fine ozs.	37,710,470	6,545,420+
Granite.....		339,917		244,243	95,674—
Gypsum.....	70,833 tons	151,807	143,549 tons	282,703	130,896+
Lead.....	1,142,405 lbs.	45,695	1,098,545 lbs.	50,533	4,838—
Lime.....	59,731 tons	573,212	64,275 tons	633,678	60,466+
Limestone.....	227,214 tons	496,054	295,792 tons	661,757	165,703+
Magnesium salts.....	2,795 tons	235,531	3,798 tons	347,838	112,307+
Marble <sup>a</sup> .....		9,884		23,011	13,127+
Mineral water.....	16,659,254 gals.	940,333	19,348,513 gals.	777,899	162,434—
Natural gas.....	302,447,193 M cu.ft.	17,680,661	298,922,708 M cu.ft.	18,585,970	905,309+
Petroleum.....	205,979,855 bbls.	179,335,311	214,776,227 bbls.	211,667,185	32,331,874+
Platinum group.....	121 fine ozs.	4,152	1,000 fine ozs.	40,669	36,517+
Pumice and volcanic ash.....	14,890 tons	\$7,055	17,132 tons	143,709	56,654+
Quicksilver.....	9,353 flasks	628,590	8,758 flasks	671,055	42,465+
Salt.....	365,711 tons	1,230,480	398,249 tons	1,227,505	2,975—
Sandstone.....		9,268		9,180	88—
Silica (sand and quartz).....	70,835 tons	297,272	77,830 tons	310,278	13,006+
Silver.....	1,191,112 fine ozs.	856,112	2,103,799 fine ozs.	1,629,392	773,280+
Slate.....		40,912		49,818	8,906+
Soapstone and talc.....	17,332 tons	170,830	25,643 tons	309,287	138,457+
Soda.....	125,504 tons	1,341,045	144,314 tons	1,412,788	71,743+
Stone, miscellaneous <sup>b</sup> .....		5,571,041		16,578,238	11,007,197+
Tungsten ore.....	118 tons	194,542	236 tons	210,819	16,277+
Zinc.....	328,013 lbs.	14,432	29,740 lbs.	1,487	12,945—
Unapportioned.....		\$4,618,406		\$5,993,907	1,375,501+
Total values.....		\$263,404,317		\$327,804,268	
Net increase.....					\$64,399,951+

\* Included under 'Unapportioned.'

<sup>a</sup> Includes onyx and travertine.

<sup>b</sup> Includes macadam, crushed rock, ballast, rubble, riprap, sand and gravel.

<sup>c</sup> Includes bituminous rock, bromine, calcium chloride, carbon dioxide, diatomite, dolomite, feldspar, graphite, iodine, iron ore, magnetite, manganese ore, mica, mineral paint, potash, pyrite, sillimanite-andalusite-kyanite group, sulphur, and tube-mill pebbles.

<sup>d</sup> Includes barite, bituminous rock, bromine, calcium chloride, carbon dioxide, diatomite, dolomite, iodine, iron ore, magnesite, mica, mineral paint, potash, pyrite, sillimanite-andalusite-kyanite group, tube-mill pebbles, and sulphur.



## By Counties.

The following table shows the comparative value of the mineral production of the various counties in the State for the years 1935 and 1936:

County	1935	1936
Alameda	\$2,010,493	\$2,413,115
Alpine	9,441	9,541
Amador	2,765,299	3,617,449
Butte	1,009,952	1,393,874
Calaveras	2,312,953	3,513,180
Colusa	1,901	15,483
Contra Costa	1,361,616	1,706,131
Del Norte	46,589	16,776
El Dorado	2,388,999	2,796,980
Fresno	30,016,686	40,245,111
Glenn	41,287	134,466
Humboldt	85,065	78,098
Imperial	124,135	256,941
Inyo	1,559,806	1,470,847
Kern	46,944,409	65,344,764
Kings	10,580,002	9,949,931
Lake	320,750	341,066
Lassen	21,732	66,283
Los Angeles	72,148,990	86,227,432
Madera	306,644	222,592
Marin	113,914	222,974
Mariposa	873,242	1,130,018
Mendocino	10,429	35,596
Merced	1,704,775	2,009,328
Modoc	52,432	32,306
Mono	223,748	498,851
Monterey	132,689	187,750
Napa	198,156	567,153
Nevada	9,195,148	10,322,695
Orange	24,360,634	22,132,919
Placer	1,026,451	1,554,865
Plumas	414,516	1,923,777
Riverside	2,226,623	4,449,170
Sacramento	4,336,763	4,254,685
San Benito	242,254	348,812
San Bernardino	9,886,453	15,396,166
San Diego	471,387	582,556
San Francisco	892	23,870
San Joaquin	416,270	461,064
San Luis Obispo	265,443	352,346
San Mateo	1,590,159	2,410,807
Santa Barbara	8,680,173	9,693,339
Santa Clara	312,676	675,188
Santa Cruz	1,533,433	2,103,122
Shasta	1,350,262	1,699,902
Sierra	860,716	787,634
Siskiyou	705,737	831,103
Solano	7,450	46,552
Sonoma	170,800	185,417
Stanislaus	585,656	691,614
Sutter	357	17,368
Tehama	11,391	100,403
Trinity	745,186	724,109
Tulare	53,911	209,968
Tuolumne	474,610	723,469
Ventura	14,236,946	17,631,880
Yolo	34,665	71,609
Yuba	1,841,221	2,893,823
Total value	\$263,404,317	\$327,804,268

## Total Mineral Production of California, by Years, Since 1887.

The following tabulation gives the total value of mineral production of California by years since 1887, in which year compilation of such data by the State Mining Bureau (now Division of Mines) began. At the side of these figures have been placed the values of the most important metal and nonmetal items—gold and petroleum.

In the same period copper made an important growth beginning with 1897 following the entry of the Shasta County mines, and later Plumas County. Cement increased rapidly from 1902, while crushed

rock, sand and gravel as a group paralleled the cement increase. Quick-silver has been up and down. Mineral water and salt have always been important items, but the values fluctuate. Borax has increased materially since 1896. War-time increases, 1915-1918, were shown by chromite, copper, lead, magnesite, manganese, silver, tungsten and zinc. Most of these have since declined, though silver, structural materials and copper increased in 1920-1924, also lead and magnesite in 1923; lead and zinc in 1925; zinc in 1926, with silver declining; an increase in quicksilver in 1927-1928, with declines in other metals and by petroleum. Natural gas showed a steady increase from 1907, and in 1928-1933 its value was second only to petroleum.

In 1929 the annual output of gold was the smallest since its discovery. From 1929 to 1936 there was a rapid increase in gold production, due in part to the raise in its price per ounce.

Total Mineral Production of California, by Years, Since 1887

Year	Total value of all minerals	Gold, value	Petroleum, value
1887	\$19,785,868	\$13,588,614	\$1,357,144
1888	19,469,320	12,750,000	1,380,666
1889	16,681,731	11,212,913	368,048
1890	18,039,666	12,309,793	384,200
1891	18,872,413	12,728,869	401,264
1892	18,300,168	12,571,900	561,333
1893	18,811,261	12,422,811	608,092
1894	20,203,294	13,923,281	1,064,521
1895	22,844,663	15,334,317	1,000,235
1896	24,291,398	17,181,562	1,180,793
1897	25,142,441	15,871,401	1,918,269
1898	27,289,079	15,906,478	2,376,420
1899	29,313,460	15,336,031	2,660,793
1900	32,622,945	15,863,355	4,152,928
1901	34,355,981	16,989,044	2,961,102
1902	35,069,105	16,810,320	4,692,189
1903	37,759,040	16,471,264	7,313,271
1904	43,778,348	19,109,600	8,317,809
1905	43,069,227	19,197,043	9,007,820
1906	46,776,085	18,732,452	9,238,020
1907	55,697,949	16,727,928	16,783,943
1908	66,363,198	18,761,559	26,566,181
1909	82,972,209	20,237,870	32,398,187
1910	88,419,079	19,715,440	37,689,542
1911	87,497,879	19,738,908	40,552,088
1912	88,972,385	19,713,478	41,868,344
1913	98,644,639	20,406,958	48,578,014
1914	93,314,773	20,653,496	47,487,109
1915	96,663,369	22,442,296	43,503,837
1916	127,901,610	21,410,741	57,421,334
1917	161,202,962	20,087,504	86,976,209
1918	199,753,837	16,529,162	127,459,221
1919	195,830,002	16,695,955	142,610,563
1920	242,099,667	14,311,043	178,394,937
1921	268,157,472	15,704,822	203,138,225
1922	245,183,826	14,670,346	173,381,265
1923	344,021,678	13,379,013	242,731,309
1924	374,620,789	13,150,175	274,652,874
1925	434,519,660	13,065,330	330,609,829
1926	450,330,856	11,923,481	345,546,677
1927	366,781,394	11,671,018	260,735,498
1928	332,224,233	10,785,315	229,998,680
1929	432,248,228	8,526,703	321,366,863
1930	365,604,695	9,451,162	271,699,046
1931	215,964,420	10,814,162	141,835,723
1932	199,196,493	11,765,726	142,890,247
1933	206,489,058	15,683,075	143,063,972
1934	237,374,709	25,131,284	159,529,671
1935	263,404,317	31,165,050	179,335,311
1936	327,804,268	37,710,470	211,667,185
Totals	\$7,302,338,147	\$826,439,518	\$4,621,416,801

## CHAPTER TWO

## FUELS

Among the most important mineral products of California are its fuels. This subdivision includes coal, natural gas, and petroleum, the combined values which make up practically 70 per cent of the State's entire mineral output for the year 1936.

There are deposits of peat known in several localities in California, small amounts of which are used as a fertilizer, and in stock-food preparations, but none has yet been recorded as utilized for fuel.

Comparison of values during 1935 and 1936 is shown in the following table:

Substance	1935		1936		Increase + Decrease— Value
	Amount	Value	Amount	Value	
Coal	8,049 tons	\$32,745	379 tons	\$1,815	\$30,930—
Natural gas...	302,447,193 M cu.ft.	17,689,661	289,922,708 M cu.ft.	18,585,970	905,309+
Petroleum	205,979,855 bbls.	179,335,311	214,776,277 bbls.	211,667,185	32,331,874+
Total values..		\$197,048,717		\$230,254,970	
Net increase..					\$33,206,253+

## COAL

*Bibliography:* State Mineralogist Reports VII, XII-XV (inc.), XVII, XIX-XXVIII (inc.), XXVI, XXXI. U. S. Geol. Surv., Bulletins 285, 316, 431, 471, 581; Ann. Rept. 22, Pl. III.

The coal production in California during 1936 totaled 370 short tons valued at \$1,815, as compared with the 1935 output which was 8,049 tons worth \$32,745. The material mined in 1936 came from a single property each, in Amador, San Benito, and Trinity counties. This coal was consumed by the local market and also used on the property for camp purposes, power and forge, to carry on regular operations and development work.

## Total Coal Production of California.

The very considerable output of coal in the years previous to 1883 was almost entirely from the Mount Diablo district, Contra Costa County. Later the Tesla mine in Corral Hollow, Alameda County, was an important producer for a few years. Stone Canyon, Monterey County, was also an important producer for a short time, and there has been some coal shipped from properties in Amador, Fresno, Orange, Riverside, Siskiyou and Trinity counties. The following tabulation gives the annual tonnages and values, according to available records:



## Coal Output and Value, by Years

Year	Tons	Value	Year	Tons	Value
1861.....	6,620	\$38,065	1900.....	176,956	\$535,531
1862.....	23,400	134,550	1901.....	150,724	401,772
1863.....	43,200	248,400	1902.....	88,460	248,622
1864.....	50,700	291,525	1903.....	93,026	265,383
1865.....	60,530	348,048	1904.....	79,062	376,494
1866.....	84,020	483,115	1905.....	46,500	144,500
1867.....	124,690	716,968	1906.....	24,850	61,600
1868.....	143,676	826,137	1907.....	23,734	55,849
1869.....	157,234	904,096	1908.....	18,496	55,503
1870.....	141,890	815,868	1909.....	49,389	216,913
1871.....	152,493	876,835	1910.....	11,033	23,484
1872.....	190,859	1,097,439	1911.....	11,047	18,297
1873.....	186,611	1,073,013	1912.....	14,484	39,092
1874.....	215,352	1,238,274	1913.....	25,198	85,809
1875.....	166,638	958,169	1914.....	11,859	28,806
1876.....	128,049	736,282	1915.....	10,299	26,662
1877.....	107,789	619,787	1916.....	4,037	7,030
1878.....	134,237	771,863	1917.....	3,527	7,691
1879.....	147,879	850,304	1918.....	6,343	16,149
1880.....	236,950	1,362,463	1919.....	2,983	8,203
1881.....	140,000	805,000	1920.....	2,078	5,450
1882.....	112,592	647,404	1921.....	12,467	63,578
1883.....	76,162	380,810	1922.....	27,020	135,100
1884.....	77,485	309,930	1923.....	1,010	5,090
1885.....	71,615	286,460	1924.....	1,425	8,800
1886.....	100,000	300,000	1925.....	730	3,880
1887.....	50,000	150,000	1926.....	1,100	5,000
1888.....	95,000	380,000	1927.....	200	1,100
1889.....	121,280	288,232	1928.....	782	4,542
1890.....	110,711	283,019	1929.....	450	2,476
1891.....	93,301	204,902	1930.....	10,885	59,858
1892.....	85,178	209,711	1931.....	12,551	77,607
1893.....	72,603	167,555	1932.....	9,508	36,468
1894.....	59,887	139,862	1933.....	2,612	11,367
1895.....	79,858	193,790	1934.....	13,549	52,720
1896.....	70,649	161,335	1935.....	8,049	32,745
1897.....	87,449	196,255	1936.....	370	1,815
1898.....	143,045	337,475			
1899.....	160,941	420,109	Totals.....	5,267,366	\$23,384,056

The tonnages in the above table for the years 1861-1886 (incl.) are taken from the U. S. Geological Survey, "Mineral Resources of the U. S., 1910," p. 107. The values assigned for the years previous to 1883 are those given by W. A. Goodyear (Mineral Res., 1882, pp. 93-94), being an average of \$5.75 per ton. From 1887 to date the figures are those of the California State Mining Bureau.

## NATURAL GAS

*Bibliography:* State Mineralogist Reports VII, X, XII, XIII, XIV, XXIX. Bulletins 3, 16, 19, 69, 73, 89. Monthly Summary Oil and Gas Supervisor, Dec., 1919; Aug., 1922; Mar., 1923; Mar. and Apr., 1926.

Statistics on the production of natural gas in California are in a considerable degree difficult to arrive at, as much of it that is utilized directly at the wells for heating, lighting, and driving gas engines is not measured. Hence, it is necessary to approximate the output of many of the operators in the oil fields, estimated on the number of lights, and on the number and horsepower of gas engines and steam boilers thus operated. The figures here given are for gas utilized locally and also that sold for distribution to consumers; and we consider are not over-estimated, particularly in the six oil-producing counties. It must be remembered that some of our important oil fields are removed many miles from the site of any other industry, and that the gathering of



small amounts of gas and transporting it for any considerable distance may not always be profitable, nor is it often possible to have pipe-line facilities available to handle the gas accompanying the early gas production in newly developed fields. Wherever feasible, casing-head gas is used in driving gas engines for pumping and drilling, and in firing the boilers of steam-driven plants.

Actual Production of Natural Gas—How Disposed of in California—1936

County	Production M cu. ft.	Utilized M cu. ft.	Wasted M cu. ft.	Stored M cu. ft.
Fresno -----	62,421,831	60,983,263	1,224,836	213,732
Kern -----	72,381,704	58,044,172	11,741,866	2,598,666
Kings -----	48,674,983	47,529,901	978,149	166,933
Los Angeles -----	69,424,338	62,611,713	5,437,384	1,375,241
Orange -----	27,164,860	21,353,868	1,301,531	4,509,461
San Joaquin -----	3,134,138	3,104,068	30,070	-----
Santa Barbara -----	6,736,061	4,562,691	2,087,167	86,203
Ventura -----	42,842,197	40,545,785	1,474,746	821,666
Other counties -----	200,303	187,247	13,056	-----
Totals -----	332,983,415	298,922,708	24,288,805	9,771,902

Production and Value.

There is a rather wide variation in prices quoted for natural gas because a considerable part is used directly in the field for driving gas engines and firing boilers, and is therefore not measured nor sold. Such companies as have placed a valuation on the gas that was thus used in 1935 gave from 1.5¢ to 73¢ per 1000 cu. ft. at the well. From the totals shown in the tabulation following herein, the average value for all fields in 1936 works out at approximately 6.22¢ per M cu. ft. Approximately 7000 cu. ft. of gas is equal to one barrel of oil in heating value, and is so accounted for by many operators. In driving gas engines, about 4000 cu. ft. per 24 hr. are consumed by a 25-h.p. engine, and 63,700 cu. ft. per day for heating a 70-h.p. steam boiler, which figures have been utilized in compiling this report, in those cases where gas was not metered.

Utilized Production of Natural Gas in California, 1936

County	M. cu. ft.	Value
Fresno -----	60,983,263	\$3,582,394
Kern -----	58,044,172	3,246,196
Kings -----	47,529,901	2,834,058
Los Angeles -----	62,611,713	4,689,852
Orange -----	21,353,868	1,466,555
San Joaquin -----	3,104,068	294,457
Santa Barbara -----	4,562,691	319,877
Ventura -----	40,545,785	2,125,746
Butte, Humboldt, Lake, Mendocino, Monterey, Sacramento, Solano, Sutter, Tulare *	187,247	26,835
Totals -----	298,922,708	\$18,585,970

\* Combined to conceal the output of individual operators in each.

The above totals showed a decrease in amount with an increased total value compared with the figures of the previous year, which were 302,447,193 M cu. ft. worth \$17,680,661. Los Angeles County led in the yield of natural gas during 1936, followed in turn by Fresno and Kern counties. Increased value of output was shown by Kern, Los Angeles, Santa Barbara, and Ventura counties: while a decrease was shown by Fresno, Kings, and Orange counties. New wells were brought in which made an appreciable production in San Joaquin and Solano counties.

## Natural Gas Production in California Since 1888.

The production of natural gas in California by years since 1888 is given in the following table. The first economic use of natural gas in California was from the famous courthouse well at Stockton, bored in 1854-1858. Beginning about 1883 and for several succeeding years, a number of gas wells were brought in around Stockton, and later at Sacramento. Natural gas was known in a number of other localities, and occasionally utilized in a small way, notably at Kelseyville in Lake County, and in Humboldt County near Petrolia and Eureka, but there are no available authentic records of amounts or values previous to the year 1888. The most important developments in the commercial production of natural gas have been coincident with developments in the oil fields, by utilizing the casing-head gas as well as that from dry-gas wells.

Natural Gas Production In California Since 1888

Year	M cubic feet	Value	Year	M cubic feet	Value
1888.....	•12,000	\$10,000	1914.....	16,529,963	\$1,049,470
1889.....	•14,500	12,680	1915.....	21,992,892	1,706,480
1890.....	•41,250	33,000	1916.....	28,134,365	2,871,751
1891.....	•39,000	30,000	1917.....	44,343,020	2,964,922
1892.....	•75,000	55,000	1918.....	46,373,052	3,289,524
1893.....	•84,000	68,500	1919.....	52,173,503	4,041,217
1894.....	•85,000	75,000	1920.....	58,567,772	3,898,286
1895.....	•110,000	100,000	1921.....	67,043,797	4,704,678
1896.....	•131,000	110,157	1922.....	103,628,027	6,990,030
1897.....	•71,300	62,657	1923.....	240,405,397	15,661,433
1898.....	•111,165	74,424	1924.....	209,021,596	15,153,140
1899.....	115,110	95,000	1925.....	194,719,924	15,890,082
1900.....	40,566	34,578	1926.....	214,549,477	19,465,347
1901.....	120,800	92,034	1927.....	224,686,940	20,447,294
1902.....	120,968	99,443	1928.....	260,887,116	22,260,947
1903.....	120,134	75,237	1929.....	400,129,201	29,675,546
1904.....	144,437	91,035	1930.....	315,513,952	24,559,840
1905.....	148,345	102,479	1931.....	344,959,920	16,690,695
1906.....	168,175	109,489	1932.....	284,168,872	16,272,061
1907.....	169,991	114,759	1933.....	271,743,544	15,403,514
1908.....	842,883	474,584	1934.....	263,207,517	14,408,761
1909.....	1,148,467	616,932	1935.....	302,447,193	17,680,661
1910.....	10,579,933	1,676,367	1936.....	298,922,708	18,585,970
1911.....	•5,000,000	491,859			
1912.....	•12,600,000	940,076	Totals.....	4,311,354,608	\$300,370,251
1913.....	14,210,836	1,053,292			

• Quantity, in part, estimated, where values only were reported

• Tabulations published previously to 1933 included values of CO<sub>2</sub>, now shown under "Industrial Materials."

## Gasoline from Natural Gas.

More or less gas usually accompanies the petroleum in the oil fields, and such gas carries varying amounts of gasoline. A total of 91 plants were in operation in 1935 recovering gasoline by compression or absorption from this 'casing-head' gas. After the gasoline is extracted the remaining 'dry gas' so far as practicable is taken into pipe lines, by which it is distributed to consumers, both domestic and commercial.

A total of 603,053,878 gallons of casing-head gasoline valued at \$33,211,791 was reported made from all fields in California by 91 plants during 1936 compared with 540,927,628 gallons worth \$26,352,213 from 91 plants in 1935. The 1936 output was distributed as follows:

<i>County</i>	<i>No. plants</i>	<i>Gallons</i>	<i>Value</i>
Fresno -----	2	33,274,992	\$1,925,555
Kern -----	18	66,874,750	3,670,721
Kings -----	7	139,804,789	7,857,067
Los Angeles -----	30	222,316,486	12,016,832
Orange -----	15	69,385,381	3,903,318
Santa Barbara -----	8	16,720,602	958,506
Ventura -----	11	54,676,878	2,879,792
Totals-----	91	603,053,878	\$33,211,791

The usual recoveries of gasoline from natural gas vary from  $\frac{1}{2}$  gal. to 3 gal. per 1000 cu. ft. of gas handled, the average being about 1 gal. per 1000 cu. ft. The U. S. Bureau of Mines Report by Knudsen<sup>1</sup> gives the average recovery for 1936 as 1.608 gallons per 1000 cu. ft. of gas treated. His figures show the following production by methods:

	<i>M cu. ft. natural gas treated</i>	<i>Gallons of gasoline recovered</i>	<i>Recovery gallons per M cu. ft.</i>
Oil absorption -----	369,316,399	593,892,866	1.608

# PETROLEUM

*Bibliography:* State Mineralogist Reports IV, VII, X, XII, XIII, XXIX, XXXI. Bulletins 3, 11, 16, 19, 31, 32, 63, 69, 73, 82, 84, 89. Reports of Oil and Gas Supervisor 1915 to date (issued in monthly chapters since April, 1919, to June, 1929, and quarterly from then on). U. S. Geol. Surv. Bulletins 213, 285, 309, 317, 321, 322, 340, 357, 398, 406, 431, 471, 541, 581, 603, 621, 623, 653, 691. Prof. Papers 116, 117. "American Petroleum; Supply and Demand"; Amer. Petr. Inst., 1925.

The crude petroleum produced in California during 1936 amounted to a total of 214,776,227 barrels having a value of \$211,667,-185 at the well. This was an increase in both amount and value as compared with the 1935 output which was 205,979,855 barrels worth \$179,335,311.

This total of quantity is compiled from the monthly production reports filed by the operators with the State Oil and Gas Supervisor.

The question of the value of the crude oil yield at the well is a difficult one to settle with exactitude principally because a large part of the output is not sold until after refining. The large refiners are also large producers of crude oil which they send direct from well to plant, hence much of the crude oil is not sold as such.

The value used in the statistical reports of the State Mining Bureau and the Division of Mines from 1914 to 1927 (inc.) was derived from an average of actual sales of crude oil of all grades in each field of the State and their average applied to the total yield of each respective field. The 1929-1933 values, used by the Division of Mines, were obtained by using the production of crude oil by gravities produced in each field<sup>1</sup> and applying an average of current price quotations for crude oil at the well as compiled by California Oil and Gas Association.

The value given to the 1934-1936 petroleum output by this department was obtained by using the average gravity oil for each field, to which was applied the average quotation for the year of said grade oil.

<sup>1</sup>Knudsen, E. T., The Petroleum Situation in the Pacific Coast Territory (Monthly for 1936), U. S. Bureau of Mines.



TABLE A  
Production and Value of Crude Oil by Counties

County	1935		1936	
	Barrels	Value	Barrels	Value
Fresno -----	27,679,545	\$26,047,611	30,035,864	\$36,317,189
Kern -----	54,723,481	39,905,553	62,273,932	53,781,287
Kings -----	7,167,687	7,490,233	5,317,882	7,115,273
Los Angeles -----	70,378,196	64,339,261	72,629,599	70,758,648
Orange -----	24,971,601	22,422,526	21,685,351	20,321,674
Santa Barbara -----	7,649,068	7,068,739	7,149,077	8,174,953
Ventura -----	13,333,298	12,016,509	15,569,523	15,118,061
San Luis Obispo, Santa Clara, Tulare * -----	76,979	44,879	-----	-----
San Bernardino, San Luis Obispo, Santa Clara, Tulare * -----	-----	-----	114,899	80,100
Totals -----	205,979,855	\$179,335,311	214,776,227	\$211,667,185

\* Combined to conceal the output of operators in each.

The foregoing totals show an average price of \$0.986 per barrel for the year 1936, as compared with \$0.870 in the year 1935, \$0.913 in 1934, \$0.831 in 1933, \$0.807 in 1932, and \$0.753 in 1931.

TABLE B  
Average Price of Oil per Barrel, by Counties, 1927-1936

County	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936
Fresno-----	\$0.830	\$0.764	\$0.519	\$0.568	\$0.551	\$0.556	\$0.573	\$0.650	\$0.941	\$1.209
Kern-----	1.139	.835	.741	.838	.636	.658	.665	.729	.729	.863
Kings-----	-----	-----	1.674	1.515	.723	.837	.934	1.085	1.045	1.338
Los Angeles-----	1.115	1.051	1.189	1.297	.784	.860	.892	.990	.914	.974
Orange-----	1.207	.935	.986	1.060	.753	.762	.827	.937	.898	.937
San Luis Obispo-----	-----	-----	-----	-----	-----	.550	-----	-----	-----	-----
Santa Barbara-----	.750	1.108	.1255	1.404	.954	.962	.848	.951	.924	1.143
Santa Clara-----	-----	-----	-----	-----	-----	.550	-----	-----	-----	-----
Ventura-----	1.177	1.098	1.150	1.396	.771	.849	.838	.944	.901	.971
State averages---	\$1.127	\$0.992	\$1.094	\$1.195	\$0.753	\$0.807	\$0.831	\$0.913	\$0.970	.986

For several years previous to 1919, the State average value per barrel at the well for crude oil as determined by the statistical returns was noted to practically coincide with the quotations during the same years for 23° gravity oil in the San Joaquin Valley fields. In 1919 and since, the average values have worked out at figures corresponding to quotations up to, in one year as high as 28° oil, due to the large yield of high-gravity oils from the new fields in the Los Angeles-Orange counties area.

TOTAL PETROLEUM PRODUCTION OF CALIFORNIA

The presence of oil seepages and springs in Los Angeles and Ventura counties was known and utilized in a small way early in the history of California. Some also was shipped to refineries at San Francisco from Santa Barbara and Humboldt counties. In the light of present-day developments, the following reference to the previous year's production of oil and its future prospects as expressed by the San Francisco Bulletin of January 8, 1866, is strikingly prophetic even though skeptical:

"It is possible that the small quantity received (40,000 or 50,000 gallons in 1865) may be the forerunner of many millions which will, at some future time, lubricate the wheels of commerce and set a trade at work excelling in variety any that has

thus far been known on this coast. At present, however, we admit to being a little skeptical about the assumption of the astute Professor Silliman that California will be found to have more oil in its soil than all the whales in the Pacific Ocean."

According to Hanks,<sup>1</sup> in 1874 production amounted to 36 bbl. per day from natural flows in Pico Cañon (Newhall), and at Sulphur Mountain (Ventura County), the oil being of 32° gravity average.

"Work was commenced in Pico Canyon in 1875 by drilling three shallow wells with spring pole, all of which yielded oil at depths of from 90 to 250 feet. Actual work of development commenced with steam machinery in 1877."<sup>2</sup>

In 1877 Pico averaged 40-50 bbl. daily, and Ventura 80 bbl. daily. In 1878, there was some production (at 60 bbl. per day, for a time) from wells in Moody Gulch, near Los Gatos, Santa Clara County, the oil being of 46° Baumé.

The first wells in the Coalinga, Fresno County, and Summerland, Santa Barbara County, fields were drilled in 1890, but Coalinga did not make its influence felt conspicuously on the state's annual output until 1903. The Summerland yield never has been large. The Salt Lake field near Los Angeles began production in 1894 and in 1897 reached over a million barrels annually.

In the Kern County fields, the first well was drilled in Sunset in 1891, Midway in 1900, McKittrick in 1892, Kern River in 1899. The Sunset-Midway district attained a yield of over 4,000,000 bbl. in 1909, and over 20,000,000 bbl. in 1910. Kern River field produced over 3,000,000 bbl. in 1901.

The first well in the Santa Maria-Lompoc group, Santa Barbara County, was drilled in 1901, and the district advanced to a yield of over 3,000,000 bbl. annually in 1905.

The Whittier-Fullerton field in Los Angeles and Orange counties became an important factor in 1902. The Montebello field, Los Angeles County, was the conspicuous addition in 1918-1919; and Elk Hills, Kern County, with Huntington Beach and Richfield, Orange County, in 1920. In 1921, the new fields added were Long Beach and Santa Fe Springs, Los Angeles County; in 1922, Torrance field in Los Angeles County, and Wheeler Ridge field in Kern County; but the production from the large number of new wells started in these new Los Angeles County fields did not reach its peak until August and September, 1923. Dominguez (Compton) came in during 1923; followed by Rosecrans and Inglewood in 1924. Ventura recorded important additions to its producing area in 1925 and 1926. Seal Beach, Orange County, and Mt. Poso, Kern County, were the new fields added in 1926; Round Mountain, Kern County, and Rineon, Ventura County, were the new fields added in 1927; with Potrero in Los Angeles County, Elwood in Santa Barbara County and Kettleman Hills in Kings County in 1928.

During 1929 Playa del Rey was added to the oil fields in Los Angeles County, and more recently a number of others have been added in Los Angeles, Kern, and Santa Barbara.

The effect of the advent of these various fields to the producing column will be noted in the tabulation herewith, by years:

<sup>1</sup> Hanks, Henry G., Report IV of State Mineralogist, p. 298, 1884.

<sup>2</sup> *Idem*, p. 301.

**TABLE C**  
**Total Petroleum Production In California**

Year	Barrels	Value	Year	Barrels	Value
To and inc. 1875 .	▲ 175,000	♣ \$472,500	1907.....	40 311,171	\$16,783,943
1876.....	12,000	30,000	1908.....	48,306,910	26,566,181
1877.....	13,000	29,250	1909.....	58,191,723	32,398,187
1878.....	15,227	30,454	1910.....	77,697,568	37,689,542
1879.....	19,858	39,716	1911.....	84,648,157	40,552,088
1880.....	40,552	60,828	1912.....	89,689,250	41,868,344
1881.....	99,862	124,828	1913.....	98,494,532	48,578,014
1882.....	128,636	257,272	1914.....	102,881,907	47,487,109
1883.....	142,857	285,714	1915.....	91,146,620	43,503,837
1884.....	262,000	655,000	1916.....	90,262,557	57,421,334
1885.....	325,000	750,750	1917.....	95,396,309	86,976,209
1886.....	▲ 377,145	♣ 870,205	1918.....	99,731,177	127,459,221
1887.....	678,572	1,357,144	1919.....	101,182,962	142,610,563
1888.....	690,333	1,380,666	1920.....	103,377,361	178,394,937
1889.....	303,220	368,048	1921.....	112,599,860	203,138,225
1890.....	307,360	384,200	1922.....	138,468,222	173,381,265
1891.....	323,600	401,264	1923.....	262,875,690	242,731,309
1892.....	385,049	561,333	1924.....	228,933,471	274,652,874
1893.....	470,179	608,092	1925.....	232,492,147	330,609,829
1894.....	783,078	1,064,521	1926.....	224,673,281	345,546,677
1895.....	1,245,339	1,000,235	1927.....	231,195,774	260,735,498
1896.....	1,257,780	1,180,793	1928.....	231,811,465	229,998,680
1897.....	1,911,569	1,918,269	1929.....	292,534,221	321,366,863
1898.....	2,249,088	2,376,420	1930.....	227,328,988	271,699,046
1899.....	2,677,875	2,660,793	1931.....	188,310,605	141,835,723
1900.....	4,319,950	4,152,928	1932.....	177,745,286	142,890,247
1901.....	7,710,315	2,961,102	1933.....	172,139,362	143,063,972
1902.....	14,356,910	4,692,189	1934.....	174,721,282	159,529,671
1903.....	24,340,839	7,313,271	1935.....	205,979,855	179,335,311
1904.....	29,736,003	8,317,809	1936.....	214,776,227	211,667,185
1905.....	34,275,701	9,007,820			
1906.....	32,624,000	9,238,020	Totals.....	4,660,161,837	\$4,625,023,318

▲ U. S. G. S., Min. Res. of U. S., 1886, p. 440, for quantities to and including 1886.

♣ Values have been estimated for the years to and including 1886, after consulting a number of contemporaneous publications, including the Mining & Scientific Press, Reports of the State Mineralogist, and U. S. Reports. The figures for 1887 to date are from records of the State Mining Bureau.



## Well Data.

The following table is compiled from monthly statements issued by the American Petroleum Institute:

TABLE D  
Wells Operated, by Fields, 1936

Field	Wells producing Dec., 1935	Wells producing Dec., 1936	Wells com- pleted during year	Daily initial output	Wells aban- doned during year	Bbls. per well produced per day Dec., 1935	Bbls. per well produced per day Dec., 1936
GROUP No. 1—Belridge—North...	31	40	11	29,104	2	239.8	267.6
Belridge—South...	169	156				14.8	12.8
Coalinga...	982	821	5	51	58	20.3	19.0
Edison...	57	89	36	5,075	16	47.1	62.1
Elk Hills...	167	151				52.8	57.8
Fruitvale...	82	128	48	10,496	5	61.7	62.0
Greeley...		1	1	2,657	2		11.0
Kern River...	1,536	1,300	72	12,351	10	13.6	10.9
Kettleman, M. D...	2	3	1	1,350	2	52.5	125.3
Kettleman, N. D...	122	122	52	80,823	5	433.2	652.8
Lost Hills...	327	271	5	1,346	10	14.8	13.6
McKittrick...	199	126	5	418	4	19.2	16.9
Midway-Sunset...	2,546	2,313	96	30,981	28	21.8	25.4
Mountain View...	114	172	62	34,220	11	221.8	153.4
Mt. Poso...	225	235	37	10,203	26	67.5	78.4
Round Mountain...	72	113	57	22,306	6	88.6	95.6
Ten Section...		2	2	2,480	2		257.5
Wheeler Ridge...	34	26			1	12.3	13.5
GROUP No. 2—Capitan...	15	25	14	4,330	3	95.3	62.4
Elwood...	64	78	6	4,254	1	195.2	156.9
Rincon...	29	29	1	95	3	63.3	71.1
San Miguelito...	5	9	5	2,202	1	162.4	176.1
Santa Barbara...	67	56	2	305	11	48.8	24.6
Santa Maria...	211	198	13	14,920	11	19.9	23.0
Summerland...	19	19				2.1	1.8
Ventura Avenue...	232	245	17	13,186		129.7	104.6
Ventura-Newhall...	552	567	13	2,843	16	7.3	8.2
Watsonville...	7	7				8.6	8.6
GROUP No. 3—Brea-Olinda...	375	360	1	42	7	26.4	22.5
Coyote—East...	84	77	3	582	2	32.2	32.3
Coyote—West...	61	48	3	2,185		159.6	172.7
Dominguez...	100	130	22	19,903		216.9	204.1
El Segundo...		4	3	2,980	1		101.8
Huntington Beach...	510	521	19	2,695	16	81.3	69.5
Inglewood...	220	201	15	19,456	2	55.8	61.8
Lawndale...	7	6			2	25.1	22.3
Long Beach...	1,269	1,242	25	3,129	68	57.3	55.0
Los Angeles— Salt Lake...	128	122			4	6.3	6.8
Montebello...	183	196	31	16,492	9	34.2	44.7
Newport...							
Playa del Rey...	208	212	10	2,543	20	75.0	59.9
Potrero...	11	10			2	33.6	30.7
Richfield...	249	260	11	1,713	6	30.8	25.7
Rosecrans...	76	77	2	135		35.8	28.5
Santa Fe Springs...	631	633	25	4,067	22	70.2	71.0
Seal Beach...	107	101	4	1,762	1	96.6	93.7
Torrance...	506	533	55	10,322	10	64.0	14.7
Whittier...	161	158			3	6.5	10.0
GROUP No. 1—Gas Fields:							
Buena Vista Lake...		5	2	Gas	1		
Buttonwillow...	24	22					
Delano...			2	Gas	2		
Dudley Ridge...							
Goleta...		3			1		
McDonald Island...			2	Gas	1		
Rio Vista...		1	1	Gas	1		
Semi-Tropic...					1		
Tracy...	2	6	4	Gas	1		
Miscellaneous drilling...					111		
Totals	12,136	12,230	802	374,002	528	46.9	48.1

**Specific Gravity of Oils Produced.**

The proportion of heavy and light oil produced in the various fields is shown in Table E, following, for which we are indebted to the Standard Oil Company. Specific gravities in California range from 8° Baumé in the Casmalia field, Santa Barbara County, to 60° in Kettleman Hills, Kings County.

California crude oils are all essentially of asphalt base, with a few notable exceptions. In the following localities are wells yielding crudes containing both asphalt and paraffine constituents: Oil City field, Coalinga; a few deep wells in East Side field, Coalinga; a considerable part of the Ventura County field; Western Minerals area, south of Maricopa; Wheeler Ridge, Kern County.

**TABLE E**  
**Production of Light and Heavy Oils, by Fields, for 1936**

<i>Field</i>	<i>Under 20° (barrels)</i>	<i>20° and above (barrels)</i>	<i>Total (barrels)</i>
<i>San Joaquin Valley</i>			
Belridge—North	1,280	3,932,232	3,933,512
Belridge—South	360,381	371,359	731,740
Coalinga	2,275,267	3,791,214	6,066,481
Edison	995,811	1,001,103	1,996,914
Elk Hills	751,779	2,449,054	3,200,833
Fruitvale	250,859	2,589,322	2,840,181
Greeley	—	3,960	3,960
Kern River	4,681,608	—	4,681,608
Kettleman Hills, Middle Dome	—	138,397	138,397
Kettleman Hills, North Dome	—	29,138,121	29,138,121
Lost Hills	648,611	695,190	1,343,801
McKittrick	775,529	5,317	780,846
Midway-Sunset	8,152,322	13,240,845	21,393,167
Mountain View	—	9,196,894	9,196,894
Mount Poso	6,656,476	—	6,656,476
Poso Creek	539,450	—	539,450
Round Mountain	3,695,800	207,389	3,903,189
Ten Section	—	188,464	188,464
Wheeler Ridge	—	128,962	128,962
<i>Coastal</i>			
Arroyo Grande	37,470	47,931	85,401
Capitan	—	570,632	570,632
Elwood	—	4,479,531	4,479,531
Lompoe	39,529	46,270	85,799
Newhall	8,763	65,685	74,448
Rincon	—	753,002	753,002
Santa Barbara Mesa	480,187	17,208	497,395
Santa Maria	482,923	1,002,294	1,485,217
San Miguelito	—	591,131	591,131
Summerland	12,547	—	12,547
Ventura Avenue	—	12,606,691	12,606,691
Balance of Ventura County Fields	56,189	1,558,713	1,614,902
Watsonville	21,960	—	21,960
<i>Southern California</i>			
Coyote—East	68,519	838,986	907,505
Coyote—West	—	3,034,459	3,034,459
Del Rey	13,602	4,591,260	4,604,862
Dominguez	—	9,711,243	9,711,243
El Segundo	—	162,430	162,430
Huntington Beach	570,145	12,684,037	13,254,182
Inglewood	662,361	3,886,575	4,548,936
Lawndale	—	34,852	34,852
Long Beach	107,489	24,903,906	25,011,395
Los Angeles	82,784	—	82,784
Montebello	153,547	3,042,075	3,195,622
Olinda Brea	253,732	2,704,918	2,958,650
Potrero	—	109,594	109,594
Richfield	383,893	2,058,834	2,442,727
Rosecrans	—	797,859	797,859
Salt Lake	203,784	—	203,784
Santa Fe Springs	19,423	16,370,170	16,389,593
Seal Beach	—	3,472,070	3,472,070
Torrance	1,965,396	796,149	2,761,545
Whittier	240,481	103,873	344,354
Wilmington	66,711	28,235	94,946
Miscellaneous	—	1,400	1,400
Totals	35,716,608	178,149,836	213,866,444



Oil in "Storage."

Field, refinery, pipe-line and tank-farm stocks of crude and refined products in the Pacific Coast<sup>1</sup> territory totaled 131,343,736 barrels December 31, 1936, as compared with 130,628,646 barrels on December 31, 1935. The total increase in stock over the year was 715,090 barrels.

	<i>Dec. 31, 1934</i> <i>(barrels)</i>	<i>Dec. 31, 1935</i> <i>(barrels)</i>	<i>Dec. 31, 1936</i> <i>(barrels)</i>
1. Nongasoline-bearing crude, Residuum, Gas and Diesel oils-----	67,182,258	68,201,291	74,445,997
2. Gasoline-bearing crude-----	37,549,934	38,950,469	33,770,339
3. Unblended natural gasoline-----	2,446,840	1,568,182	1,828,636
4. Gasoline (not including distributing and service stations)-----	10,343,477	10,760,001	12,384,540
5. Naphtha distillates-----	*928,053	*1,695,564	*1,387,940
6. All other stocks-----	†7,767,755	†9,453,139	†7,526,284
7. Totals all stock-----	126,218,317	130,628,646	131,343,736
*Estimated amount of unfinished gasoline contained in item No. 5-----	753,082	1,133,084	1,133,326
†Coke included in item No. 6-----	568,915	456,766	246,292

Utilization of California's Crude Oil.

Most of the crude oil produced in California is sent to storage reservoirs at tank farms near the oilfields and from these reservoirs by pipelines to the refineries, the larger ones of which are located in the vicinity of Los Angeles and on San Francisco Bay.

During 1936 the crude oil consumed in California, according to the U. S. Bureau of Mines<sup>2</sup> was 189,743,799 barrels sent to stills at the refineries; 13,302,222 barrels to foreign shipments; and 21,083,244 barrels were either consumed as fuel or added to residuum and non-gasoline-bearing crude.

The production of petroleum products during 1936 is shown in Table F:

TABLE F

<i>Commodity</i>	<i>Amount in</i> <i>barrels</i>
Crude petroleum-----	189,743,799
Natural gasoline including liquid petroleum gas-----	14,569,293
Gasoline-----	77,237,595
Kerosene-----	3,938,346
Lubricating oils and greases-----	2,159,449
Gas oil and Diesel oil-----	26,571,235
Residuum nongasoline-bearing crude (a)-----	80,846,520
Asphalt and road oils-----	5,677,620
Coke (in tons)-----	467,691
Naphtha distillates-----	2,239,635
Other unfinished oils-----	385,518
Shortage and still gas production-----	-----
Total petroleum (net) (b)-----	204,313,092

(a) Includes 21,083,244 bbls. of heavy crude oil.

(b) Total of crude oil and natural gas gasoline.

<sup>1</sup> American Petroleum Institute: Summary of California Oilfield Operations for December, 1936.

<sup>2</sup> Knudsen, E. T., The petroleum situation in the Pacific Coast territory (monthly) 1936, U. S. Bureau of Mines.

## CHAPTER THREE

## METALS

*Bibliography:* Reports of State Mineralogist I-XXXIII (inc.). Bulletins 5, 6, 18, 23, 27, 36, 50, 57, 76, 78, 85, 92, 95, 108. Spurr and Wormser, "Marketing of Metals and Minerals." See also under each metal.

The total value of metals produced in California during 1936 was \$41,392,418. Chief among these is and always has been gold; followed by silver, quicksilver, tungsten ore, iron ore, copper, zinc, lead, platinum.

A comparison of the 1935 output with that of the 1936 output is afforded by the following table:

Substance	1935		1936		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Chromite.....	523 tons	\$6,111	221 tons	\$3,314	\$2,797—
Copper.....	2,031,836 lbs.	168,645	9,991,799 lbs.	919,245	750,600+
Gold.....	890,430 fine ozs.	31,165,050	1,077,442 fine ozs.	37,710,470	6,545,420+
Lead.....	1,142,405 lbs.	45,695	1,098,545 lbs.	50,533	4,838+
Platinum group metals.....	147 ozs.	4,152	1,134 ozs.	40,669	36,517+
Quicksilver.....	9,353 flasks	628,590	8,758 flasks	671,055	42,465+
Silver.....	1,191,112 fine ozs.	857,112	2,103,799 fine ozs.	1,629,392	772,280+
Tungsten.....	118 tons	194,542	236 tons	210,819	16,277+
Zinc.....	328,013 lbs.	14,432	29,740 lbs.	1,487	12,945—
Unapportioned <sup>a</sup> .....		115,438		155,434	39,996+
Total values.....		\$33,199,767		\$41,392,418	
Net increase.....					\$8,192,651+

<sup>a</sup> Includes iron ore and manganese ore.

## ALUMINUM

*Bibliography:* Report XVIII, p. 198. Bulletins 38, 67. U. S. Geol. Surv., Min. Res. of U. S.

To date there has been no commercial production of aluminum ore in California. Only a single authenticated occurrence of bauxite has thus far been noted in this state, being in Riverside County southeast of Corona, but as yet undeveloped.

## ANTIMONY

*Bibliography:* State Mineralogist Reports VIII, X, XII-XV (inc.), XVII, XXII, XXIII, XXV-XXVII (inc.), XXXI. Bulletins 38, 91.

During 1936 there were no shipments of antimony ore in California. The principal commercial production of antimony in California has come from Kern, Inyo and San Benito counties, and other occurrences have been noted in Nevada, Riverside, San Bernardino and Santa Clara counties. The commonest occurrence is in the form of the sulphide, stibnite; but in the Kernville and Havilah districts in Kern

County there were notable deposits of the native metal, being among the few localities of the world where native antimony has been found.

Present New York quotations (Oct. 14, 1937) are around 18½¢ per pound for Chinese (duty paid) and 16½¢ for American spot antimony.

#### Antimony Production in California, by Years.

The production of antimony ore in California by years since 1887 has been as follows:

Year	Tons	Value	Year	Tons	Value
1887.....	75	\$15,500	1902.....		
1888.....	100	20,000	1915.....	510	\$35,666
1889.....			1916.....	1,015	64,793
1893.....	50	2,250	1917.....	158	18,786
1894.....	150	6,000	1918.....		
1895.....	33	1,485	1925.....		
1896.....	17	2,320	1926.....	*26	770
1897.....	20	3,500	1927.....	20	590
1898.....	40	1,200	1928.....	20	761
1899.....	75	13,500	1929.....		
1900.....	70	5,700			
1901.....	50	8,350	Totals.....	2,429	\$201,171

\* Annual details concealed under 'Unapportioned.'

#### ARSENIC

*Bibliography:* Reports XVIII, XXIII, XXV, XXX. Bulletin 67. U. S. G. S., Min. Res. of U. S.

Arsenic is found in a number of localities in California in the mineral arsenopyrite ( $\text{FeAsS}$ ), which is frequently gold bearing; and in scorodite ( $\text{FeAsO}_4 + 2\text{H}_2\text{O}$ ), an oxidation product of arsenopyrite. The occurrence of realgar ( $\text{AsS}$ ) has also been noted.

Except for a small output in 1924, there has been no commercial recovery of arsenic from Californian ores. There having been only a single operator, the figures are concealed under the 'Unapportioned' item.

#### BERYLLIUM

*Bibliography:* State Mineralogist Report XXVII. Eng. & Min. Jour.-Press, Vol. 118, No. 8, p. 285, Aug. 23, 1924. U. S. Bureau of Mines Information Circular 6190.

Beryllium is a metal resembling aluminum closely in its chemical character. It has a specific gravity of 1.85, is almost as hard as quartz (will scratch glass) and will take a high polish. The use of beryllium as a metal is still more or less in the experimental stage because the cost of extracting the metal from its ores almost makes it prohibitive and the present sources of supply of the ore are limited. Not until such a time when deposits can be found that will assure a definite supply and metallurgical costs are such as to justify its use, will the metal be found in common use.

There are a number of beryllium minerals, but none have been found in commercial quantities, except beryl, which is a beryllium-aluminum silicate. The chief use at present for ground beryl is as an addition to porcelain products, where it reduces the coefficient of expansion. Beryllium metal is difficult to separate from aluminum.



Present (Oct. 14, 1937) quotations for beryllium ore are per ton in carload lots, minimum 10 per cent BeO \$30; minimum 12 per cent BeO, \$35, f.o.b. mine.

Beryl occurs in California in the pegmatite dikes of the tourmaline gem district in northern San Diego and northwestern Riverside counties; and an occurrence has recently been noted in western Inyo County, but the quantity is as yet unproved. Thus far there have been no commercial shipments of beryl from California except for gem purposes (the pink and aquamarine varieties).

#### BISMUTH

*Bibliography:* Bulletins 38, 67, 91. Am. Jour. Sci., 1903, Vol. 16.

Several bismuth minerals have been found in California, notably native bismuth and bismite (the ochre) in the tourmaline gem district in San Diego and Riverside counties near Pala. Other occurrences of bismuth minerals, including the sulphide, bismuthinite, have been noted in Inyo, Fresno, Nevada, Tuolumne, San Bernardino, and Mono counties, but only in small quantities. The only commercial production recorded was 20 tons valued at \$2,400 in 1904, and credited to Riverside County.

The present quotation (Oct. 14, 1937) for bismuth is \$1.00 per pound, in ton lots for the refined metal.

#### CADMIUM

*Bibliography:* U. S. Geol. Surv., Min. Res. of U. S., 1908, 1918.

During 1917 and 1918, cadmium metal was recovered by the electrolytic zinc plant of the Mammoth Copper Company in Shasta County. It was shipped in the form of 'sticks' and amounted to a total of several thousand pounds for the two years, the exact figures being concealed under 'Unapportioned.' That was the first, and thus far the only, commercial production of cadmium recorded from Californian ore. Cadmium occurs there associated with zinc sulphide, sphalerite. Cadmium also occurs in the Cerro Gordo Mines, Inyo County, associated with smithsonite (zinc carbonate).

The present quotation (Oct. 14, 1937) for cadmium is \$1.25 per pound for the refined metal.

#### CHROMITE

*Bibliography:* State Mineralogist Reports IV, XII, XIII, XIV, XV, XVII, XVIII, XXI-XXIX (inc.), XXXI, XXXII. Bulletins 38, 76, 91. Preliminary Report 3. U. S. G. S., Bull. 430. Min. & Sci. Press, Vol. 114, p. 552.

During the year 1936 there were shipments of chromite or chromic-iron ore in California amounting to 221 short tons, recalculated to a basis of 45% Cr<sub>2</sub>O<sub>3</sub>, valued at \$3,314 f.o.b. shipping point, and came from El Dorado, Fresno, Napa, and San Luis Obispo counties. This was all material that had been mined in past years but not sold until 1936. The 1936 shipments showed a decrease in both amount and value under those of 1935 which were 488 tons worth \$6,111.

Occurrence.

Chromite is widely distributed in California, the principal production, thus far, having come from El Dorado, San Luis Obispo, Del Norte, Shasta, Siskiyou, Placer, Fresno, and Tuolumne counties. In 1918 a total of 29 counties contributed to the State's output. There are two main belts in California yielding this mineral, one along the Coast Ranges from San Luis Obispo County to the Oregon line, including the Klamath Mountains at the north end, and the other in the Sierra Nevada from Tulare County to Plumas County. Chromite occurs as lenses in basic igneous rocks such as peridotite and pyroxenite, and in serpentines which have been derived by alteration of such basic rocks.

Imports.

Imports during 1936 to the United States, of foreign chromite<sup>1</sup> duty free, mainly from Rhodesia, New Caledonia and India, totaled 324,258 long tons valued at \$4,431,898 for 1936, compared with 253,946 tons worth \$3,538,380 for 1935.

Total Chromite Production of California.

Production of chromite in California began, apparently, about 1874, principally in San Luis Obispo County. There was considerable activity from 1880 to 1883, inclusive, and a total of 23,238 long tons (or 26,028 short tons), valued at \$329,924, was shipped from that county up to the beginning of 1887. Some ore also was shipped from the Tyson properties in Del Norte County. The tabulation herewith shows the output of chromite in California, annually, including the earliest figures so far as they are available. The figures from 1887 to date are from the records of the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1874-1887 (San Luis Obispo County).....	26,028	\$329,924	1912.....	1,270	\$11,260
1887.....	3,000	40,000	1913.....	1,180	12,700
1888.....	1,500	20,000	1914.....	1,517	9,434
1889.....	2,000	30,000	1915.....	3,725	38,044
1890.....	3,599	53,985	1916.....	48,943	717,244
1891.....	1,372	20,580	1917.....	52,379	1,130,298
1892.....	1,500	22,500	1918.....	73,955	3,649,497
1893.....	3,319	49,785	1919.....	*4,314	97,164
1894.....	3,680	39,980	1920.....	1,770	43,031
1895.....	1,740	16,795	1921.....	347	6,870
1896.....	786	7,775	1922.....	379	6,334
1897.....			1923.....	84	1,658
1898.....			1924.....	350	6,700
1899.....			1925.....	191	3,712
1900.....	140	1,400	1926.....	393	7,063
1901.....	130	1,950	1927.....	225	5,063
1902.....	315	4,725	1928.....	729	15,179
1903.....	150	2,250	1929.....	327	5,025
1904.....	123	1,845	1930.....	84	1,905
1905.....	40	600	1931.....	441	6,737
1906.....	317	2,859	1932).....	1,206	16,587
1907.....	302	6,040	1933).....		
1908.....	350	6,195	1934.....	291	3,498
1909.....	436	5,309	1935.....	488	6,111
1910.....	749	9,707	1936.....	221	3,314
1911.....	935	14,197	Totals.....	247,325	\$6,493,379

\* Recalculated to 45% Cr<sub>2</sub>O<sub>3</sub>, beginning with 1919.  
 \* Annual details concealed under 'Unapportioned.'

<sup>1</sup> Monthly Summary of Foreign Commerce of U. S. Bureau of Foreign and Domestic Commerce, Dec., 1936.

## COBALT

*Bibliography:* Report XIV. Bulletins 67, 91. U. S. G. S., Min. Res. of U. S., 1912, 1918. U. S. B. M., I. C. 6331.

Occurrences of some of the cobalt minerals have been noted in several localities in California, but to date no commercial production has resulted. Some of the copper ores of the foothill copper belt in Mariposa and Madera counties have been found to contain cobalt up to 3%.

The nominal quotation for cobalt (Oct. 14, 1937) is around 97 to 99% at \$1.92 per pound for the refined metal.

## COPPER

*Bibliography:* State Mineralogist Reports VIII-XXXII (inc.). Bulletins 23, 50, 91.

The output of copper in California during 1936 amounted to a total of 9,991,799 pounds recoverable metal valued at \$919,245. This was an increased amount and value over the 1935 production which was 2,031,836 pounds worth \$168,645. The average price of copper in 1936 was 9.2¢ per pound compared with 8.3¢ in 1935; 8.0¢ in 1934; 6.4¢ in 1933; 6.3¢ in 1932; and 9.1¢ in 1931.

Copper was second to gold among the metals in California from 1896 to 1932, when it was passed in output by quicksilver and silver, and in 1933 also by tungsten, and in 1936 only by silver.

Distribution of the 1936 output of copper in California by counties was as follows:

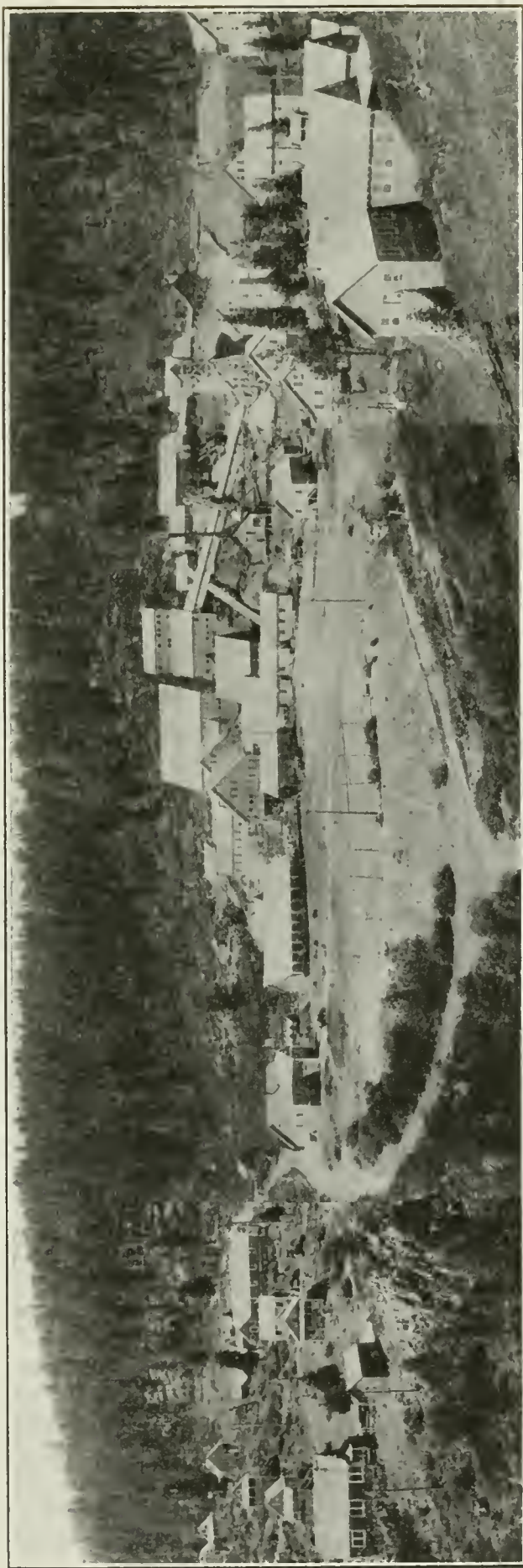
<i>County</i>	<i>Pounds</i>	<i>Value</i>
Amador -----	31,542	\$2,902
Butte -----	5,008	460
Calaveras -----	1,814	167
El Dorado -----	21,661	1,993
Inyo -----	57,230	5,265
Kern -----	1,402	129
Mariposa -----	2,350	216
Mono -----	6,748	621
Nevada -----	149,673	13,770
Placer -----	3,080	283
Plumas -----	9,675,770	\$90,171
Riverside -----	6,355	585
San Bernardino -----	10,110	930
Siskiyou -----	1,805	166
Tuolumne -----	10,082	927
Fresno, Imperial, Lassen, Los Angeles, Merced, Napa, Orange, Sacramento, Shasta, Sierra, Trinity, Tulare, Yuba *-----	7,169	660
Totals -----	9,991,799	\$919,245

\* Combined to conceal the output of individual producers in each.

According to preliminary data issued by the U. S. Bureau of Mines<sup>1</sup> the smelter production of primary copper from domestic sources during 1936 amounted to 1,222,819,396 pounds, an increase of approximately 60 per cent compared with 1935 output. The value increased approximately 76 per cent in 1936. The average price of copper delivered during the year, as reported to the U. S. Bureau of Mines by selling agents, was 9.2¢ per pound.

<sup>1</sup> U. S. Bureau of Mines, Mineral Year Book 1937, p. 146.





Panorama of Walker Mine and Mill, Plumas Co. Photo by Chas. V. Averill.

**Copper Production of California, by Years.**

Although some mining of copper ores in a small way had been done earlier, shipments in appreciable quantities began in 1861 and continued of importance up to the end of 1867, when a total of 68,631 tons (of 2376 pounds) of high-grade ores, and 847 tons of matte or 'regulus'<sup>1</sup> had been shipped to smelters at New York, Boston, and Swansea, Wales. The most important district at that time was Copperopolis and vicinity in Calaveras County, with some shipments also made from Mariposa, El Dorado, Fresno and San Luis Obispo counties. From 1868 to 1882, the output was insignificant. There are wide discrepancies in the figures recorded for copper production previous to 1882, in which year the data of the U. S. Geological Survey began. The detailed statistics of the California State Mining Bureau began in the year 1894.

Amount and value of copper production in California annually since 1882 is given in the following tabulation:

**Copper Production of California, by Years**

Year	Pounds	Value	Year	Pounds	Value
1882.....	826,695	\$144,672	1910.....	53,721,032	\$6,680,641
1883.....	1,600,862	265,743	1911.....	36,838,024	4,604,753
1884.....	876,166	120,911	1912.....	34,169,997	5,638,049
1885.....	469,028	49,248	1913.....	34,471,118	5,343,023
1886.....	430,210	43,021	1914.....	30,491,535	4,055,375
1887.....	1,600,000	192,000	1915.....	40,968,966	7,169,567
1888.....	1,570,021	235,303	1916.....	55,809,019	13,729,017
1889.....	151,505	18,180	1917.....	48,534,611	13,249,948
1890.....	23,347	3,502	1918.....	47,793,046	11,805,883
1891.....	3,397,405	424,675	1919.....	22,162,605	4,122,246
1892.....	2,980,944	342,808	1920.....	12,947,299	2,382,303
1893.....	239,682	21,571	1921.....	12,088,053	1,559,358
1894.....	738,594	72,486	1922.....	22,883,987	3,090,582
1895.....	225,650	21,901	1923.....	28,346,860	4,166,989
1896.....	1,992,844	199,519	1924.....	52,089,349	6,823,704
1897.....	13,638,626	1,540,666	1925.....	46,968,499	6,669,527
1898.....	21,543,229	2,475,168	1926.....	33,521,544	4,693,014
1899.....	23,915,486	3,990,534	1927.....	27,350,316	3,582,888
1900.....	29,515,512	4,748,242	1928.....	25,162,304	3,623,360
1901.....	34,931,788	5,501,732	1929.....	33,809,258	5,941,799
1902.....	27,860,162	3,239,975	1930.....	26,534,752	3,449,522
1903.....	19,113,861	2,520,997	1931.....	12,954,842	1,178,890
1904.....	29,974,154	3,969,995	1932.....	1,417,536	89,307
1905.....	16,997,489	2,650,605	1933.....	992,515	63,521
1906.....	28,726,448	5,522,712	1934.....	590,638	47,252
1907.....	32,602,945	6,341,387	1935.....	2,031,836	168,645
1908.....	40,868,772	5,350,777	1936.....	9,991,799	919,245
1909.....	65,727,736	8,478,142			
			Totals.....	1,157,079,501	\$183,334,930

**GOLD**

*Bibliography:* State Mineralogist Reports I to XXXIII (inc.), (except III and VIII). Bulletins 36, 45, 57, 91, 92, 95, 108. U. S. Geol. Surv., Prof. Paper 73. U. S. Bur. of Mines, Econ. Paper 3 (1929).

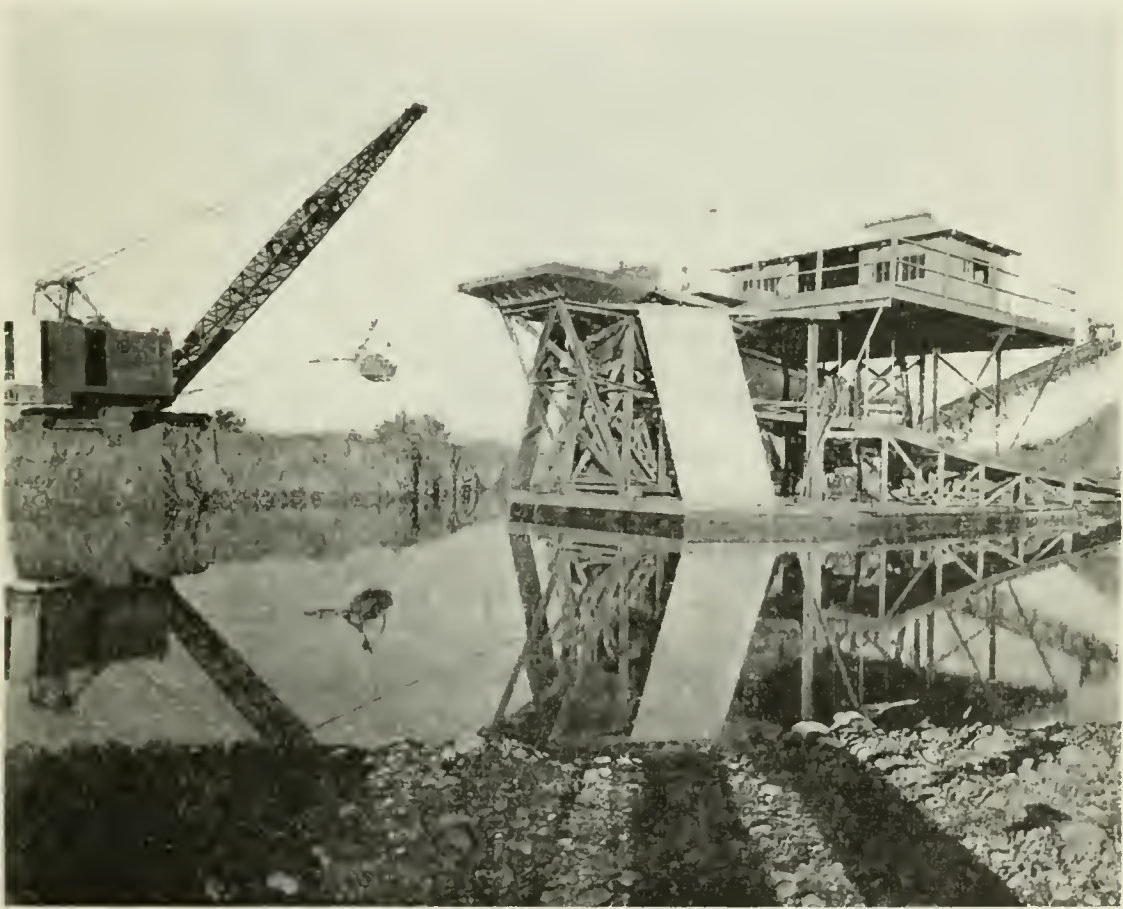
Gold was first, and, for many years, the most important single mineral product of California. Although now surpassed for a number of years in annual value by petroleum, and by natural gas from 1923 to 1932, it still heads our metal list, and California continues to outrank all the other gold-producing States of the United States, includ-

<sup>1</sup> Brown, J. Ross, *Mineral Resources West of the Rocky Mountains*, p. 168, 1867.



ing Alaska. In fact, at present, California is producing approximately 24% of the gold mined in the entire United States.

There has been a steady increase in the development of both lode and placer mines in California during the last six years, brought about by the present economic conditions. During 1936 there were 1542 operators in California, not including snipers, prospectors and various individuals, selling gold in small lots to the bullion dealers. There was no premium paid on gold during 1932, the price being \$20.67 a fine ounce. On August 29, 1933, there was an executive order lifting the embargo on gold ores, concentrates, precipitates, and unretorted amalgam, followed on October 25, 1933, by another order instructing the Reconstruction Finance Corporation to buy newly-mined gold at a price fixed by the U. S. Treasurer which corresponded to the world price, all of which had an effect on the 1933 gold yield. On January



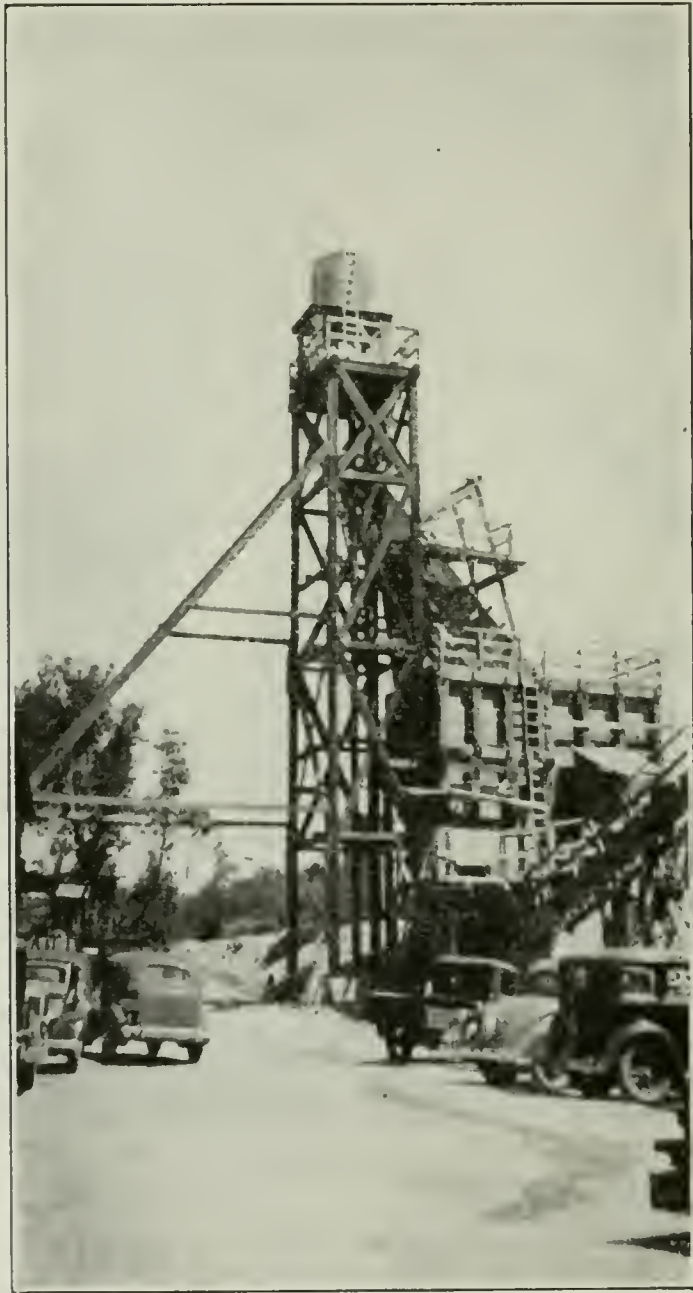
Dragline and Washing equipment of Atlas Gold Dredging Corp. at Comanche, Calaveras Co. Photo by Pacific Gas & Electric Co.

30, 1934, the Gold Reserve Act of 1934 was passed, followed by the President's proclamation of January 31, 1934, which fixed the weight of the gold dollar at 15 5/21 grains, nine-tenths fine. The value of gold thereby became \$35 a fine ounce. The average weighted value of gold per fine ounce in 1934 was \$34.95.

The production of gold in California during 1936 totaled 1,077,442 fine ounces valued at \$37,710,470, being an increase of 187,012 fine ounces over the 1935 yield. Deep or lode mines accounted for 668,019

fine ounces worth \$23,380,665, and placers (mainly bucket-line, drag-line and power-shovel dredges) produced 409,423 fine ounces worth \$14,329,805.

As the Division of Mines has never independently gathered the statistics of gold and silver production, these figures, as in former years, are published by cooperation with and through the courtesy of Charles White Merrill and H. M. Gaylord of the Division of Mineral Statistics, U. S. Bureau of Mines.



Head frame, Auburn-Chicago Mine, Penryn, Placer Co. Photo by C. A. Logan.

The largest production in 1936 was reported from Nevada County with an output of 282,779 fine ounces (\$9,897,265); Sacramento County second with 104,575 fine ounces (\$3,660,125); Amador County third with 97,210 fine ounces (\$3,402,350); Yuba County fourth with 81,358 fine ounces (\$2,847,530); Kern County fifth with 68,608 fine ounces



(\$2,401,280); followed in turn by Calaveras, El Dorado, Merced, Placer, and Shasta counties each with a total output worth in excess of a million dollars.

Nevada held the first place as a gold producing county with an output exceeding that of Yuba or Amador which held first and second places respectively in 1928 with Sacramento fourth that year. Sacramento held second place since 1931, its output exceeding that of Amador, which held second place in 1930. The gold from Yuba and Sacramento comes almost entirely from dredges, while that from Nevada and Amador counties comes mainly from the lode mines.

Distribution of the 1936 gold output by counties was as follows:

County	Number of operators <sup>a</sup>		Value
	Lode	Placer	
Amador-----	46	19	\$3,402,350
Butte-----	22	46	1,202,460
Calaveras-----	53	61	2,113,055
El Dorado-----	53	29	1,988,735
Fresno-----	3	6	15,225
Humboldt-----	--	13	36,155
Imperial-----	8	3	41,965
Inyo-----	54	9	744,135
Kern-----	103	14	2,401,280
Lassen-----	4	--	31,010
Los Angeles-----	18	7	177,030
Madera-----	14	9	23,485
Mariposa-----	67	20	863,485
Merced-----	--	5	1,462,160
Mono-----	20	--	64,120
Nevada-----	42	32	9,897,265
Placer-----	36	57	1,366,400
Plumas-----	19	37	781,970
Riverside-----	35	9	216,125
Sacramento-----	--	9	3,660,125
San Bernardino-----	76	7	140,105
San Diego-----	7	--	2,170
Shasta-----	32	26	1,304,590
Sierra-----	22	31	770,945
Siskiyou-----	52	82	639,030
Stanislaus-----	--	5	289,975
Trinity-----	30	52	708,715
Tulare-----	6	--	840
Tuolumne-----	59	26	476,105
Ventura-----	3	--	2,345
Yuba-----	8	16	2,847,530
Alpine, Del Norte, Monterey, Napa, Orange, San Joa- quin, San Luis Obispo, Santa Clara, Santa Cruz--	11	9	39,585
Totals -----	903	639	\$37,710,470

<sup>a</sup> Number does not include snipers, prospectors, and various individuals selling small lots to bullion dealers.

The following is quoted from the advance statement of gold in 1936 by courtesy of the U. S. Bureau of Mines,\* Department of Commerce:

"Gold. The production of recoverable gold in California was 1,077,442 fine ounces valued at \$37,710,470 in 1936—an increase of 21 percent in quantity and value over 1935. Lode mines produced 668,019 ounces of gold valued at \$23,380,665 or 62 per cent of the total gold; placer mines produced 409,423 ounces of gold valued at \$14,329,805 or 38 percent of the total. In 1935 lode mines produced 61 percent and placer mines 39 percent of the total, and in 1934 the percentages were 62 and 38 percent, respectively. There follows a list of companies (or mines) operating lode-gold mines, arranged roughly in their order of importance as producers: Empire Star Mines Co., Ltd. (Nevada County), Idaho Maryland Mines Corporation (Nevada County), Lava Cap Gold Mining Corporation (Nevada County), Golden Queen Mining Co. (Kern County), Kennedy Mining & Milling Co. (Amador County), Argonaut Mining Co., Ltd. (Amador County), the Iron Mountain property of the Mountain Copper Co., Ltd. (Shasta County), the Big Canyon property of the Mountain Copper Co., Ltd. (El Dorado County), the Carson Hill Gold Mining Co. (Calaveras County), Cardinal Gold Mining Co. (Inyo County), Original Sixteen to One Mine, Inc. (Sierra County), the Yellow Aster mine of the Anglo American Mining Corporation (Kern County), Walker Mining Co. (Plumas County), and Tropic mine operated by Burton Bros., Inc. (Kern County). The following were the leading gold producers

\* U. S. Bureau of Mines, Mineral Year Book, 1937, p. 253.

from placers in California, arranged roughly in order of their output in 1936: Yuba Consolidated Gold Fields (Yuba County), Natomas Co. (Sacramento County), Capital Dredging Co. (Sacramento County), Snelling Gold Dredging Co. (Merced County), Yuba Consolidated Gold Fields (Merced County), Arroyo Seco Gold Dredging Co. (Amador County), Gold Exploration Mining Co. (Yuba County), and the Comanche Gold Dredging Co. (Calaveras County). The lode and placer mines listed produced over three-fifths of the State's total gold. In all, there were 903 lode and 639 placer mines operating during the year. Since the depression many people lacking other employment have panned gold by hand in the streams of California with the hope of extracting enough to furnish the bare necessities of life. Although the average income of this class of miners has been small, a few of the more fortunate ones have discovered rich pockets. A special study of the 1935 production of the small-scale placer-gold miners was made by the Bureau during the year in cooperation with the Works Progress Administration. The miners usually worked ground they did not own. The total output for 1935 exceeded \$1,000,000 and over 19,000 men were thus engaged at some time during the year. Although definite figures are not available for 1936, it appears that this class of miners again contributed a large quantity of bullion to the State production. Greater employment opportunities in other fields appear to have somewhat decreased the number on the creeks; many, however, are still working on the streams."

#### Total Gold Production of California.

The presence of gold in stream gravels near Los Angeles was known and worked in a small way by the Indians, at least as early as 1841,<sup>1</sup> and possibly 1820.<sup>2</sup> On March 2, 1844, Don Manuel Castanares, deputy for California to the Congress of Mexico, reported<sup>3</sup> to his government that placers near Los Angeles had produced up to December, 1843, a total of 2000 ounces of gold dust, most of which had been sent to the United States Mint at Philadelphia.

As the padres and the rancheros discouraged the quest of gold, this early, small production caused no particular excitement. It was not until James W. Marshall's finding of gold nuggets in the tail-race of Sutter's saw mill on the American River, January 24, 1848, was heralded abroad that the great rush began, and California became a commonwealth of first rank almost over night. There are, however, no authentic data on gold production prior to 1848, other than occasional, scattered references such as above quoted.

The following table was originally compiled by Chas. G. Yale, of the Division of Mineral Resources, U. S. Geological Survey, but for a number of years statistician of the California State Mining Bureau and the U. S. Mint at San Francisco. The authorities chosen for certain periods were: J. D. Whitney, State Geologist of California; John Arthur Phillips, author of "Mining and Metallurgy of Gold and Silver" (1867); U. S. Mining Commissioner R. W. Raymond; U. S. Mining Commissioner J. Ross Browne; Wm. P. Blake, Commissioner from California to the Paris Exposition, where he made a report on "Precious Metals" (1867); John J. Valentine author for many years of the annual report on precious metals published by Wells, Fargo & Company's Express; and Louis A. Garnett, in the early days manager of the San Francisco refinery, where records of gold receipts and shipments were kept. Mr. Yale obtained other data from the reports of the director of the U. S. Mint and the director of the U. S. Geological Survey. The authorities referred to who were alive at the time of the original compilation of this table in 1894 were all consulted in person or by letter by Mr. Yale with reference to the correctness of their published data, and the final table quoted was then made up.

The figures for 1903-1923 (inclusive) are those prepared by the U. S. Geological Survey; and since by the U. S. Bureau of Mines:

<sup>1</sup> Hittell, T. H., *History of California*, Vol. II, p. 312, 1885.

<sup>2</sup> Bancroft, H. H., *History of California*, Vol. II, p. 417, 1886.

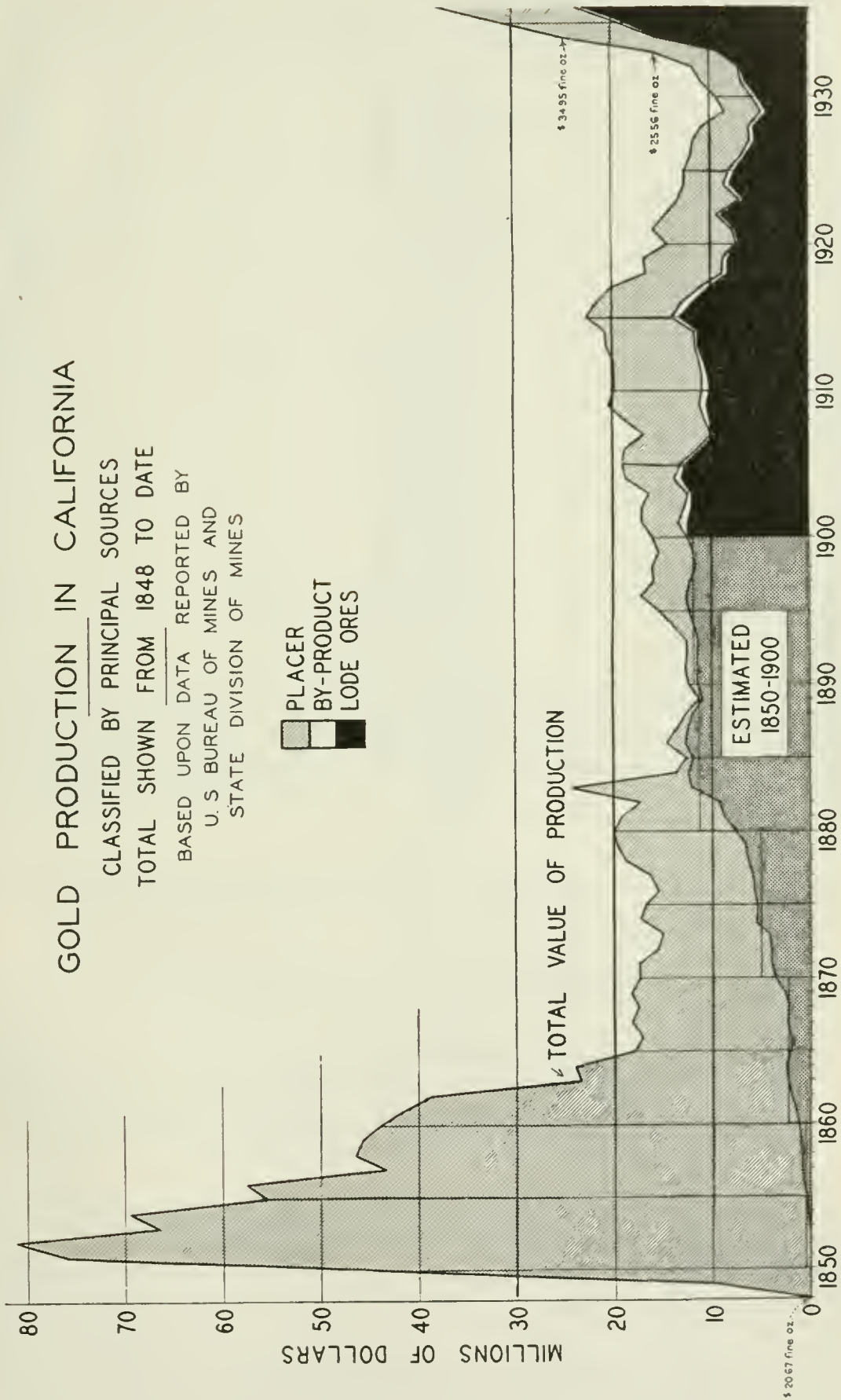
<sup>3</sup> *Mercantile Trust Review of the Pacific*, Vol. XIV, No. 2, p. 43, Feb. 15, 1925.



# GOLD PRODUCTION IN CALIFORNIA

CLASSIFIED BY PRINCIPAL SOURCES  
TOTAL SHOWN FROM 1848 TO DATE  
BASED UPON DATA REPORTED BY  
U.S. BUREAU OF MINES AND  
STATE DIVISION OF MINES

PLACER  
BY-PRODUCT  
LODE ORES



## Total Gold Production of California

Year	Value	Year	Value
1848.....	\$245,301	1894.....	\$13,863,282
1849.....	10,151,360	1895.....	15,334,317
1850.....	41,273,106	1896.....	17,181,562
1851.....	75,938,232	1897.....	15,871,401
1852.....	81,794,700	1898.....	15,906,478
1853.....	57,613,487	1899.....	15,336,031
1854.....	69,433,931	1900.....	15,863,355
1855.....	55,485,395	1901.....	16,989,044
1856.....	57,509,411	1902.....	16,910,320
1857.....	43,628,172	1903.....	16,300,653
1858.....	46,591,140	1904.....	18,633,676
1859.....	45,846,599	1905.....	18,898,545
1860.....	44,095,163	1906.....	18,732,452
1861.....	41,884,995	1907.....	16,727,928
1862.....	28,854,668	1908.....	18,761,559
1863.....	23,501,736	1909.....	20,237,870
1864.....	24,071,423	1910.....	19,715,440
1865.....	17,930,858	1911.....	19,738,908
1866.....	17,123,867	1912.....	19,713,478
1867.....	18,265,452	1913.....	20,406,958
1868.....	17,555,867	1914.....	20,653,496
1869.....	18,229,044	1915.....	22,442,296
1870.....	17,458,133	1916.....	21,410,741
1871.....	17,477,885	1917.....	20,087,504
1872.....	15,482,194	1918.....	16,528,953
1873.....	15,019,210	1919.....	16,695,955
1874.....	17,264,836	1920.....	14,311,043
1875.....	16,876,009	1921.....	15,704,822
1876.....	15,610,723	1922.....	14,670,346
1877.....	16,501,268	1923.....	13,379,013
1878.....	18,839,141	1924.....	13,150,175
1879.....	19,626,654	1925.....	13,065,330
1880.....	20,030,761	1926.....	11,923,481
1881.....	19,223,155	1927.....	11,671,018
1882.....	17,146,416	1928.....	10,785,315
1883.....	24,316,873	1929.....	8,526,703
1884.....	13,600,000	1930.....	9,451,162
1885.....	12,661,044	1931.....	10,814,162
1886.....	14,716,506	1932.....	11,765,726
1887.....	13,588,614	1933.....	<sup>a</sup> 15,683,075
1888.....	12,750,000	1934.....	<sup>b</sup> 25,131,284
1889.....	11,212,913	1935.....	<sup>c</sup> 31,165,050
1890.....	12,309,793	1936.....	37,710,470
1891.....	12,728,869		
1892.....	12,571,900	Total.....	\$1,973,925,961
1893.....	12,538,780		

<sup>a</sup> Value calculated at an average weighted price of \$25.56 per fine ounce; previously \$20.6718.

<sup>b</sup> Value calculated at an average weighted price of \$34.95 per fine ounce.

<sup>c</sup> Value \$35 per fine ounce, beginning 1935.

## IRIDIUM (see under Platinum)

## IRON ORE

*Bibliography:* State Mineralogist Reports II, IV, V, X, XII-XV (inc.), XVII, XVIII, XXI-XXVII (inc.), XXX, XXXI. Bulletins 38, 67, 91. Am. Inst. Min. Eng., Trans. LIII. Min. & Sci. Press, Vol. 115, pp. 112, 117-122; Vol. 123, pp. 94-96, 113-114.

During 1936 shipments of iron ore were made in California coming from two properties in San Bernardino County and one in Santa Cruz County. The material mined in 1935 came from two properties in San Bernardino County. That coming from the first named county was hematite and used in the manufacture of high-iron cement, the latter produced magnetite. The annual details are combined under the 'Unapportioned' item to conceal the output of either operator. There are considerable deposits of iron ore known in California, notably in Shasta, Madera, Placer, Riverside, San Bernardino, and Los Angeles

counties, but production has so far been limited for lack of an economic supply of coking coal. Some pig iron has been made, utilizing charcoal for fuel, both in blast furnaces and by electrical reduction; also, ferrochrome, ferromanganese, and ferrosilicon have been made in California.

Iron Ore Production in California, by Years.

Total iron ore production of California, with annual amounts and values, is as follows:

Year	Tons	Value	Year	Tons	Value
1881*	9,273	\$79,452	1917	2,874	\$11,496
1882	2,073	17,766	1918	3,108	15,947
1883	11,191	106,540	1919	2,300	13,796
1884	4,532	40,983	1920	5,975	40,889
1885			1921	1,970	12,030
1886	3,676	19,250	1922	3,588	18,868
1887			1923	3,102	18,665
1893	250	2,000	1924		
1894	200	1,500	1925	785	4,710
1895			1926		
1907	400	400	1927	5,272	26,000
1908			1928		
1909	108	174	1930		
1910	579	900	1931	100	700
1911	558	558	1932		
1912	2,508	2,508	1934		
1913	2,343	4,485	1935	38,339	163,714
1914	1,436	5,128	1936	a	a
1915	724	2,584			
1916	3,000	6,000	Totals	110,244	\$717,043

\* Productions for the years 1881-1886 (inc.) were reported as "tons of pig iron" (U.S.G.S., Min. Res. 1885), and for the table herewith are calculated to "tons of ore" on the basis of 47.6% Fe as shown by an average of analyses of the ores (State Mineralogist Report IV, p. 242). This early production of pig iron was from the blast furnaces then in operation at Hoteling in Placer County. Charcoal was used in lieu of coke. Though producing a superior grade of metal, they were obliged finally to close down, as they could not compete with the cheaper English and eastern United States iron brought in by sea to San Francisco.

a Annual details concealed under 'Unapportioned.'

LEAD

Bibliography: State Mineralogist Reports IV, VIII-XV (inc.), XVII-XXVIII (inc.), XXX, XXXI.

The production of lead in California during 1936 amounted to a total of 1,098,545 pounds of recoverable metal valued at \$50,533 compared with the 1935 figures of 1,142,405 pounds worth \$45,695. The average price of lead in 1936 was 4.6¢ per pound compared with 4.0¢ per pound in 1935, 3.7¢ per pound in 1934, 3.7¢ per pound in 1933, 3.0¢ per pound in 1932, and 3.7¢ per pound in 1931.

Distribution of the 1936 output of lead by counties was as follows:

County	Pounds	Value
Amador	4,296	\$197
Calaveras	4,755	219
Inyo	556,399	25,594
Mono	16,805	773
Nevada	307,272	14,134
Placer	5,178	238
Riverside	53,983	2,483
Sacramento	3,141	147
San Bernardino	115,621	5,318
Tulare	9,276	427
Butte, El Dorado, Imperial, Mariposa, Merced, Napa, Orange, Plumas, Shasta, Sierra, Siskiyou, Trinity, Tuolumne *	21,819	1,003
Totals	1,098,545	\$50,533

\* Combined to conceal the output of individual operators in each.



## Lead Production of the United States.

According to preliminary data issued by the U. S. Bureau of Mines<sup>1</sup> during 1936, the production of primary lead in the United States was 387,698 short tons, valued at \$35,668,000, being an increase over the national production of 1935 which was 310,505 short tons worth \$24,840,000.

## Lead Production of California, by Years.

Statistics on lead production in California were first compiled by this Bureau in 1887. Amount and value of the output, annually, with total figures, to date, are given in the following table:

Lead Production in California, by Years

Year	Pounds	Value	Year	Pounds	Value
1877.....	<sup>a</sup> 7,836,000	\$391,800	1908.....	1,124,483	\$46,663
1878.....	8,640,000	328,320	1909.....	2,685,477	144,897
1879.....	4,502,000	191,335	1910.....	3,016,902	134,082
1880.....	4,200,000	215,460	1911.....	1,403,839	63,173
1881.....	6,680,000	325,316	1912.....	1,370,067	61,653
1882.....	<sup>b</sup> 4,000,000	196,800	1913.....	3,640,951	160,202
1883.....	<sup>c</sup> 3,400,000	145,520	1914.....	4,697,400	183,198
1884.....	3,200,000	120,512	1915.....	4,796,299	225,426
1885.....	2,000,000	80,900	1916.....	12,392,031	855,049
1886.....	2,000,000	93,400	1917.....	21,651,352	1,862,016
1887.....	<sup>d</sup> 1,160,000	52,200	1918.....	13,464,869	956,006
1888.....	900,000	38,250	1919.....	4,139,562	219,397
1889.....	940,000	35,720	1920.....	4,903,738	392,300
1890.....	800,000	36,000	1921.....	1,149,051	51,707
1891.....	1,140,000	49,020	1922.....	6,511,280	358,120
1892.....	1,360,000	54,400	1923.....	9,934,522	695,416
1893.....	666,000	24,975	1924.....	4,984,387	398,751
1894.....	950,000	28,500	1925.....	7,352,422	639,661
1895.....	1,592,400	49,364	1926.....	8,067,873	645,429
1896.....	1,293,500	38,805	1927.....	2,748,440	173,151
1897.....	596,000	20,264	1928.....	1,882,795	109,102
1898.....	655,000	23,907	1929.....	1,428,777	90,014
1899.....	721,000	30,642	1930.....	3,542,796	176,241
1900.....	1,040,000	41,600	1931.....	3,934,240	145,568
1901.....	720,500	28,820	1932.....	2,418,626	72,480
1902.....	349,440	12,230	1933.....	772,463	28,583
1903.....	110,000	3,960	1934.....	804,911	29,655
1904.....	124,000	5,270	1935.....	1,142,405	45,695
1905.....	533,680	25,083	1936.....	1,098,545	50,533
1906.....	338,718	19,307			
1907.....	328,681	16,690	Totals.....	199,837,422	\$11,638,538

<sup>a</sup> Quantities for 1877-1881 (inc.) from C. E. Siebenthal, Mineral Resources of U. S. 1912, Part I, U. S. Geol. Survey, p. 339; and values for same years from quotations in Eng. & Min. Jour. of New York.

<sup>b</sup> Estimated.

<sup>c</sup> Quantities and values for 1883-1886 (inc.) from Mineral Resources of U. S. Geol. Surv., 1883-1886, respectively.

<sup>d</sup> Data from 1887 to date from reports of California State Mining Bureau.

## MANGANESE

*Bibliography:* State Mineralogist Reports XII-XV (inc.), XVIII, XXII-XXVII (inc.), XXIX-XXXI. Bulletins 38, 67, 76, 91. U. S. G. S. Bull. 427. Eng. & Min. Jour.-Press, Vol. 117, p. 545.

During 1936 there were no shipments of manganese ore reported in California. The material mined in 1935 came from a single property in Riverside County and was consumed in the steel mills of the State. The annual details are concealed under the 'Unapportioned' item as one operator made all the shipments.

<sup>1</sup> U. S. Bureau of Mines, Mineral Market Notes 546, June 1, 1937.



Imports of foreign manganese ore into the United States<sup>1</sup> during 1936, mainly from Soviet Russia, Gold Coast, Cuba, and Brazil, amounted to 846,648 long tons of ore containing 415,749 long tons of manganese valued at \$8,819,600, as compared with 383,498 long tons containing 189,258 long tons of manganese worth \$4,208,769.

The Tariff Act of 1930 provides for an import duty of 1¢ per pound on the metallic manganese contained, for "manganese ore (including ferruginous manganese ore) or concentrates containing in excess of 10 per centum of metallic manganese."

#### Manganese Ore Production in California, by Years.

Production of manganese ore in California began at the Ladd Mine, San Joaquin County, in the Tesla District in 1867. When shipments of this ore to England ceased late in 1874, upwards of 5000 tons had been produced by that property. For some years following that, the output was small. The tabulation herewith shows California's output of manganese ore, annually, since 1887, when the compilation of such figures was begun by the State Mining Bureau:

Year	Tons	Value	Year	Tons	Value
1887.....	1,000	\$9,000	1912.....	22	\$400
1888.....	1,500	13,500	1913.....		
1889.....	53	901	1914.....	150	1,500
1890.....	386	3,176	1915.....	4,013	49,098
1891.....	705	3,830	1916.....	13,404	274,601
1892.....	300	3,000	1917.....	15,515	396,659
1893.....	270	4,050	1918.....	26,075	979,235
1894.....	523	5,512	1919.....	11,569	451,422
1895.....	880	8,200	1920.....	2,892	62,323
1896.....	518	3,415	1921.....	1,005	12,210
1897.....	504	4,080	1922.....	540	7,650
1898.....	440	2,102	1923.....	690	10,620
1899.....	295	3,165	1924.....	1,115	25,785
1900.....	131	1,310	1925.....	832	19,450
1901.....	425	4,405	1926.....	235	4,700
1902.....	870	7,140	1927.....		
1903.....	1	25	1928.....		
1904.....	60	900	1929.....	733	8,216
1905.....			1930.....	207	2,576
1906.....	1	30	1931.....		
1907.....	1	25	1932.....		
1908.....	321	5,785	1933.....	432	4,630
1909.....	3	75	1934.....		
1910.....	265	4,235	1935.....		
1911.....	2	40	1936.....		
			Totals.....	88,883	\$2,398,976

\* Annual details concealed under 'Unapportioned.'

#### MOLYBDENUM

*Bibliography:* State Mineralogist Reports XIV, XVII-XXIV (inc.), XXVI-XXVIII (inc.), XXX. Bulletins 67, 91. U. S. Bur. of Min., Bulletin 111. Proc. Colo. Sci. Soc., Vol. XI.

Molybdenum is used as an alloy constituent in the steel industry, and in certain forms of electrical apparatus. Included in the latter is its successful substitution for platinum and platinum-iridium in electric contact-making and -breaking devices. In alloys it is used similarly to and in conjunction with chromium, cobalt, iron, manganese.

<sup>1</sup> U. S. Bureau of Foreign and Domestic Commerce, Monthly Summary, Dec., 1936.

nickel, tungsten, and vanadium. The oxides and the ammonium salt have important chemical uses.

The two principal molybdenum minerals are: the sulphide, molybdenite, and wulfenite, lead molybdate; the former furnishing practically the entire commercial output. Molybdenite is found in or associated with acidic igneous rocks, such as granite and pegmatite.

Deposits of disseminated molybdenite are known in several localities in California, and in at least two places it occurs in small masses associated with copper sulphides. The first recorded commercial shipments of molybdenum ore in California were during the war 1916-1918. Some development work has been done on a high-grade deposit at the head of the Kaweah River, Tulare County.

The Tariff Act of 1930 provides for an import duty of 35 cents a pound for the metallic molybdenum content of molybdenum ores or concentrates.

The present (Oct. 14, 1937) quotations on molybdenum ores are 42¢ per pound of  $\text{MoS}_2$  contained, delivered at Pittsburgh, Pa., and on ferromolybdenum are 95¢ per pound Mo, 50%-60% Mo f.o.b. shipping point.

During 1936 there was no production of molybdenum ore reported mined in California. In 1933 and 1934 there were shipments of molybdenum concentrates in California amounting to 1432 pounds 91.23%  $\text{MoS}_2$  valued at \$306. The annual details are combined under the 'Unapportioned' item to conceal the output of either operator. The material shipped in 1933 came from Inyo County and had been mined for several years, and that shipped in 1934 came from Mono County and was mined in 1933.

#### Molybdenum Production of California, by Years.

California's production of molybdenum ore by years is summarized in the following tabulation:

Year	Tons	Value
1916	8	\$9,945
1917	243	9,014
1918	*	300
1919	-----	-----
1933 } <sup>a</sup>	-----	-----
1934 }	b	306
Totals	252	\$19,565

\* 300 pounds of 90%  $\text{MoS}_2$  concentrate.

<sup>a</sup> Annual details concealed under 'Unapportioned.'

<sup>b</sup> 1432 pounds of 91.23%  $\text{MoS}_2$  concentrates.

#### NICKEL

*Bibliography:* State Mineralogist Reports XIV, XVII, XXIV, XXV, XXVIII, XXX. U. S. G. S., Bulletin 640-D. U. S. Bureau of Standards, Circular 100.

Nickel occurs in the Friday Copper Mine in the Julian District, San Diego County. The ore is a nickel-bearing pyrrhotite, with some associated chalcopyrite. Some ore has been mined in the course of development work but not treated nor disposed of, as they were unable

to get any smelter to handle it for them. Nickel ore has also been reported from other localities in California, but not yet confirmed.

Present (Oct. 14, 1937) quotations for nickel are around 35¢-36¢ per pound for the refined metal.

OSMIUM (see under Platinum)

PALLADIUM (see under Platinum)

#### PLATINUM GROUP METALS

*Bibliography:* State Mineralogist Reports IV, VIII, IX, XII-XXVI (inc.), XXVIII, XXX, XXXI. Bulletins 38, 45, 67, 85, 91, 92. U. S. Geol. Surv., Bulletins 193, 285. Trans. Am. Inst. Min. Eng., Vol. 47, pp. 217-218.

In California the platinum-group metals are obtained as a by-product from placer operations for gold. The major portion of it comes from the dredges working in Amador, Butte, Sacramento, Stanislaus, Shasta, Trinity and Yuba counties, with a small amount coming from the hydraulic and surface-sluicing mines of Del Norte, Humboldt, Siskiyou and Trinity counties.

The shipments of the platinum-group metals in California during 1936 amounted to 1.134 ounces crude containing 1,000.02 fine ounces valued at \$40,669. Some of the above material was mined prior to 1936 but not sold until then. This metal came from properties in Calaveras, Del Norte, El Dorado, Merced, Nevada, Placer, Plumas, Sacramento, Shasta, Siskiyou, Trinity, Stanislaus, and Yuba counties. Of the above sold in 1936, 677.32 fine ounces was platinum; 136.92 fine ounces, iridium; 87.99 fine ounces, osmium; and 97.79 fine ounces, a mixture of ruthenium, palladium, and rhodium. The 1935 output was 536 ounces of which 147 ounces crude containing 121 fine ounces worth \$4,153 was sold.

#### Prices.

The average prices during 1936 for the various platinum-group metals per fine ounce, according to refiners' reports, as given by the U. S. Bureau of Mines<sup>1</sup> were: Platinum, \$41.76; palladium, \$23.03; iridium, \$88.44; osmium, \$47.50; rhodium, \$64.83; and ruthenium, \$33.69, compared with 1935 prices which were: platinum, \$32.60; palladium, \$23.25; iridium, \$50.90; osmium, \$51; rhodium, \$44; and ruthenium, \$39.

<sup>1</sup>U. S. Bureau of Mines, Mineral Market Report 558, July 15, 1937.



## Platinum Production of California, by Years.

The annual production and values since 1887 have been as follows:

Year	Ounces	Value	Year	Ounces	Value
1887.....	416	\$10,400	1913.....	368	\$17,738
1888.....	100	400	1914.....	463	14,816
1889.....	500	2,000	1915.....	667	21,149
1890.....	500	2,000	1916.....	886	42,642
1891.....	600	2,500	1917.....	610	43,719
1892.....	100	500	1918.....	571	42,788
1893.....	80	440	1919.....	*418	60,611
1894.....	75	517	1920.....	477	68,977
1895.....	100	600	1921.....	613	58,754
1896.....	150	900	1922.....	795	90,288
1897.....	162	944	1923.....	602	78,546
1898.....	150	900	1924.....	273	36,452
1899.....	300	1,800	1925.....	292	39,937
1900.....	300	1,800	1926.....	322	32,005
1901.....	400	2,500	1927.....	139	10,749
1902.....	250	3,200	1928.....	312	27,902
1903.....	39	468	1929.....	212	14,416
1904.....	70	1,052	1930.....	217	11,700
1905.....	123	1,849	1931.....	305	11,979
1906.....	200	3,320	1932.....	278	8,142
1907.....	91	1,647	1933.....	236	7,255
1908.....	300	6,255	1934.....	424	14,884
1909.....	706	13,414	1935.....	121	4,153
1910.....	337	8,386	1936.....	1,000	40,669
1911.....	511	14,873			
1912.....	603	19,731	Totals.....	17,758	\$902,667

\* Fine ounces, beginning with 1919.

## QUICKSILVER

*Bibliography:* State Mineralogist Reports IV, V, XII-XV, XVII-XXIX (inc.). XXXI, XXXII. Bulletin 27, 78, 91. U. S. Geol. Surv., Monograph XIII. U. S. Bur. of Mines, Tech. Papers 96, 227; Bulletin 222, 335.

The production of quicksilver in California during the year 1936 was 8758 flasks valued at \$671,055, compared with the 1935 output of 9353 flasks worth \$628,590. Distribution of the 1936 output was as follows:

County	Flasks	Value
Lake .....	3795	\$292,571
Napa .....	737	55,556
San Benito .....	640	50,271
San Luis Obispo.....	2588	196,786
Santa Clara .....	166	11,581
Sonoma .....	182	14,081
Colusa, Contra Costa, Fresno, Inyo, Kern, Monterey, Santa Barbara, Solano, Trinity, Yolo*.....	650	50,209
Totals.....	8758	\$671,055

\* Combined to conceal the output of individual operators.

## Prices.

During 1936 the average for New York monthly quotations<sup>1</sup> was \$79.917 per 76-lb. flask. The average price for 1935 was \$71.992. The average price for January, 1936 was \$76.77, raising to the end of the year with an average for December of \$90.25. The average price

<sup>1</sup> Engineering & Mining Journal, Vol. 137, 1936.



received by producers in California during 1936 was \$76.62 per 76-lb. flask, compared with \$67.23 per flask in 1935.

The U. S. Bureau of Mines<sup>1</sup> reported the total production of the United States for 1936 at 16,569 flasks valued at \$1,324,194. The national production for 1935 was 17,518 flasks worth \$1,261,121. California was by a considerable margin the largest producing state, with approximately 41 per cent of the total, other producing states being Oregon, Texas, Arkansas, Washington, Nevada, and Arizona. The 1936 imports of quicksilver amounted to 18,088 flasks valued at \$1,017,817 compared with 7815 flasks valued at \$381,516 in 1935, an increase of 132 per cent. Of total imports for 1936, Spain supplied 10,195 flasks, Italy 6470 flasks, United Kingdom 1076 flasks, and Mexico 347 flasks.

#### Total Quicksilver Production of California.

Total amount and value of the quicksilver production of California, as given in available records, are shown in the following tabulation. Though the New Almaden Mine in Santa Clara County was first worked in 1824, and has been in practically continuous operation since 1846 (the yield being small the first two years), there are no available data on the output earlier than 1850. Previous to June, 1904, a 'flask' of quicksilver contained 76½ pounds; then 75 pounds up to and including 1927; beginning with 1928, 76 pounds. In compiling this table the following sources of information were used: for 1850-1883, table by J. B. Randol, in Report of State Mineralogist IV, p. 336; 1883-1893, U. S. Geological Survey reports; 1894 to date, statistical bulletins of the State Mining Bureau; also State Mining Bureau, Bulletin 27, "Quicksilver Resources of California," 1908, p. 10.

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<sup>1</sup> U. S. Bureau of Mines, Mineral Report 547, May 27, 1937.

Year	Flasks	Value	Average price per flask	Year	Flasks	Value	Average price per flask
1850	7,723	\$768,052	\$99 45	1895	36,104	\$1,337,131	\$37 04
1851	27,779	1,859,248	66 93	1896	30,765	1,075,449	34 96
1852	20,000	1,166,600	58 33	1897	26,691	993,445	37 28
1853	22,284	1,235,648	55 45	1898	31,092	1,188,626	38 23
1854	39,004	1,663,722	55 45	1899	29,454	1,405,045	47 70
1855	33,000	1,767,150	53 55	1900	26,317	1,182,786	44 94
1856	30,000	1,549,500	51 65	1901	26,720	1,285,014	48 46
1857	28,204	1,374,381	48 73	1902	29,552	1,276,524	43 20
1858	31,000	1,482,730	47 83	1903	32,094	1,335,954	42 25
1859	13,000	820,690	63 13	1904	28,876	1,086,323	37 62
1860	10,000	535,500	53 55	1905	24,655	886,081	35 94
1861	35,000	1,471,750	42 05	1906	19,516	712,334	36 50
1862	42,000	1,526,700	36 35	1907	17,379	663,178	38 16
1863	40,531	1,705,544	42 08	1908	18,039	763,520	42 33
1864	47,489	2,179,745	45 90	1909	16,217	773,788	47 71
1865	53,000	2,432,700	45 90	1910	17,665	799,002	45 23
1866	46,550	2,473,202	53 13	1911	19,109	879,205	46 01
1867	47,000	2,157,300	45 90	1912	20,600	866,024	42 04
1868	47,728	2,190,715	45 90	1913	15,661	630,042	40 23
1869	33,811	1,551,925	45 90	1914	11,373	557,846	49 05
1870	30,077	1,725,818	57 38	1915	14,199	1,157,449	81 52
1871	31,686	1,999,387	63 10	1916	21,427	2,003,425	93 50
1872	31,621	2,084,773	65 93	1917	24,382	2,396,466	98 29
1873	27,642	2,220,482	80 33	1918	22,621	2,579,472	114 03
1874	27,756	2,919,376	105 18	1919	15,200	1,353,381	89 04
1875	50,250	4,228,538	84 15	1920	10,278	775,527	75 45
1876	75,074	3,303,256	44 00	1921	3,157	140,666	44 56
1877	79,396	2,961,471	37 30	1922	3,466	191,851	55 35
1878	63,880	2,101,652	32 90	1923	5,458	332,851	60 98
1879	73,684	2,194,674	29 85	1924	7,948	543,080	68 33
1880	59,926	1,857,706	31 00	1925	7,683	621,831	80 81
1881	60,851	1,815,185	29 83	1926	5,892	516,382	87 64
1882	52,732	1,488,624	28 23	1927	6,488	714,418	111 67
1883	46,725	1,343,344	28 75	1928	7,107	844,649	118 84
1884	31,913	973,347	30 50	1929	10,152	1,195,705	117 78
1885	32,073	986,245	30 75	1930	11,374	1,255,257	110 36
1886	29,981	1,064,326	35 50	1931	13,478	1,121,624	83 22
1887	33,760	1,430,749	42 38	1932	5,349	279,780	52 30
1888	33,250	1,413,125	42 50	1933	4,102	229,472	55 94
1889	26,464	1,190,880	45 00	1934	7,946	534,135	67 22
1890	22,926	1,203,615	52 50	1935	9,353	628,590	67 23
1891	22,904	1,036,406	45 25	1936	8,758	671,055	76 62
1892	27,993	1,139,595	40 71				
1893	30,164	1,108,527	36 75	Totals	2,803,538	\$116,522,189	--
1894	30,416	934,000	30 70				

\* Flasks of 75 lbs. since June, 1904; of 76½ lbs. previously.

• Flasks of 76 pounds, from January, 1928.

## SILVER

*Bibliography:* State Mineralogist Reports IV, VIII, XII-XXXI (inc.). Bulletins 67, 91, 108. Min. & Sci. Press, March 1, 1919.

The 1936 silver output in California totaled 2,103,799 fine ounces valued at \$1,629,392, being an increase in both amount and value over the figures of the previous year which were 1,191,112 fine ounces worth \$856,112. Of the 1936 yield, there was 33,081 fine ounces worth \$25,620 from placers. The average price paid for newly mined domestic silver was 77.45¢ per fine ounce during 1936, compared with 71.875¢ per fine ounce in 1935, 64.6¢ per fine ounce in 1934, and 35¢ per fine ounce in 1933.

Distribution of the 1936 silver production by counties was as follows:

<i>County</i>	<i>Fine ounces</i>	<i>Value</i>
Amador -----	23,365	\$18,096
Butte -----	12,648	9,796
Calaveras -----	15,806	12,242
El Dorado -----	11,702	9,063
Fresno -----	96	74
Humboldt -----	152	118
Imperial -----	740	573
Inyo -----	51,511	39,895
Kern -----	381,651	295,591
Lassen -----	2,343	1,815
Los Angeles -----	2,444	1,893
Madera -----	233	180
Mariposa -----	6,141	4,756
Merced -----	4,433	3,433
Mono -----	425,106	329,245
Nevada -----	455,345	352,665
Placer -----	20,745	16,067
Plumas -----	284,161	220,083
Riverside -----	6,232	4,827
Sacramento -----	4,239	3,283
San Bernardino -----	235,433	182,343
San Diego -----	16	12
Shasta -----	29,329	22,715
Sierra -----	4,473	3,464
Siskiyou -----	3,709	2,873
Stanislaus -----	989	766
Trinity -----	2,907	2,251
Tulare -----	59	46
Tuolumne -----	3,909	3,028
Ventura -----	4	3
Yuba -----	4,468	3,460
Alpine, Del Norte, Monterey, Napa, Orange, San Joaquin, San Luis Obispo, Santa Clara, Santa Cruz-----	109,407	84,736
Totals -----	2,103,799	\$1,629,392

The following paragraph is quoted from the U. S. Bureau of Mines,<sup>1</sup> chapter on Gold and Silver from Mineral Year Book 1937, by courtesy of Charles White Merrill and H. M. Gaylord:

"Silver—The production of recoverable silver in California was 2,103,799 fine ounces valued at \$1,629,392 in 1936 compared with 1,191,112 fine ounces valued at \$856,112 in 1935—an increase of 77 per cent in quantity and 90 per cent in value. The companies (or mines) producing the largest quantities of silver, in the approximate order of their importance, are as follows: Sierra Consolidated Mines, Inc. (Mono County), Walker Mining Co. (Plumas County), Golden Queen Mining Co. (Kern County), Lava Cap Gold Mining Corporation (Nevada County), Kelly mine (Kern County), and the Empire Star Mines Co., Ltd. (Nevada County). The Sierra Consolidated Mines, Inc., works its Silverado mine principally for silver, but the other leading silver producers derived the bulk of their revenue from other metals. The Walker mine was worked mainly for the copper content of its ores; the other mines listed were worked for gold. On the other hand, almost all the mines in the State derived at least a small amount of revenue from silver; even the gold dredges found the silver content of their bullion a profitable byproduct."

#### Silver Production of California, by Years.

The amount and value of the silver production of California, and the average price, annually, since 1880 are given in the table following. In the table shown in the statistical bulletins previous to Bulletin 97 (for 1925), the values shown for 1880–1904 (inc.) were taken from the reports of the Director of the Mint, of which the figures for 1880–1896 (inc.) were based on 'coinage value' (\$1.2929 per fine ounce). We have recalculated these to commercial value, using the price table of the U. S. Geological Survey (McCaskey, H. D.), Gold and Silver, 1913: Mineral Resources of the U. S., Part I, p. 847. From 1905 to date, the figures are those of the U. S. Geological Survey and its successors, the

<sup>1</sup> U. S. Bureau of Mines, Mineral Year Book 1937, p. 253.



U. S. Bureau of Mines. Figures for the years prior to 1880 are not available, as there were no reliable records compiled.

Silver Production of California, by Years, Since 1880

Year	Fine oz.	Value	Average price per oz.	Year	Fine oz.	Value	Average price per oz.
1880	882,169	\$1,014,494	\$1 15	1910	1,840,085	\$993,646	\$0 54
1881	580,091	655,503	1 13	1911	1,270,445	673,336	53
1882	653,569	745,069	1 14	1912	1,300,136	799,584	615
1883	1,129,244	1,253,461	1 11	1913	1,378,399	832,553	604
1884	3,236,987	3,593,056	1 11	1914	1,471,859	813,938	553
1885	1,986,260	2,125,298	1 07	1915	1,678,756	851,129	507
1886	1,245,747	1,233,290	99	1916	2,564,354	1,687,345	658
1887	1,262,282	1,237,036	98	1917	1,775,431	1,462,955	824
1888	1,314,874	1,235,982	94	1918	1,427,711	1,427,711	1 00
1889	823,947	774,510	94	1919	1,107,189	1,240,051	1 12
1890	820,336	861,353	1 05	1920	1,706,327	1,859,896	1 09
1891	737,224	729,852	99	1921	3,629,223	3,629,223	1 00
1892	358,575	311,960	87	1922	3,100,065	3,100,065	1 00
1893	415,468	324,065	78	1923	3,559,443	2,918,743	82
1894	229,896	144,834	63	1924	3,555,133	2,381,952	67
1895	463,911	501,542	65	1925	3,054,416	2,119,765	694
1896	326,757	222,195	68	1926	2,022,460	1,262,015	624
1897	754,648	452,789	60	1927	1,620,242	918,677	567
1898	701,788	414,055	59	1928	1,478,771	865,081	585
1899	855,869	513,521	60	1929	1,176,895	627,285	533
1900	1,168,157	724,257	62	1930	1,622,803	624,779	385
1901	950,831	570,499	60	1931	867,818	251,667	290
1902	1,163,041	616,412	53	1932	493,533	139,176	282
1903	958,230	517,444	54	1933	402,591	140,907	350
1904	1,441,259	835,929	58	1934	844,413	545,883	*614
1905	1,076,174	650,009	61	1935	1,191,112	856,112	*719
1906	1,220,641	817,830	68	1936	2,103,799	1,629,392	*775
1907	1,138,856	751,646	66				
1908	1,647,278	873,057	53	Totals	80,885,591	\$60,244,916	
1909	2,098,253	1,091,092	52				

\* Average price applied to newly mined within the United States.

## TIN

*Bibliography:* Reports XV, XVII, XVIII, XXV, XXXI. Bulletins 67, 91.

In 1928 and 1929 there was a small amount of tin produced from California ore as well as considerable development work which was done at the Temescal mine in Riverside County near Corona. There was an output from the district during 1891-1892 as tabulated below. Small quantities of stream tin have been found in some of the placer workings in northern California, but never in paying amounts.

Two occurrences have also been noted, in northern San Diego County. Crystals of cassiterite were found there, associated with blue tourmaline crystals, amblygonite and beryl. No commercial quantity has been developed, only small pockets having been taken out.

## Total Output of Tin in California

Year	Pounds	Value
1891	125,289	\$27,564
1892	126,000	32,400
1928		
1929	1,200	580
Totals	252,489	\$60,544

\* Annual details concealed under 'Unapportioned.'



## TITANIUM

*Bibliography:* State Mineralogist's Report XXIII.

During 1936 there was no production of titanium ores reported in California. In 1927 the first recorded shipments of titanium minerals were made in California. The total of the 1927 and 1928 production was 10,013 tons valued at \$150,195. All of this came from Los Angeles County and was produced from either the beach black sands which contained approximately 20% titaniferous iron and magnetite, the gangue being silica and several silicates, or from a lode deposit in the San Gabriel Mountains.

The market price of titanium minerals varies as to the titanium oxide it contains. Present (Oct. 14, 1937) quotations are: Rutile 94% TiO at 10¢ a pound, ilmenite 45 to 52% TiO at \$10 to \$12 a ton, all prices Atlantic seaboard.

## TUNGSTEN

*Bibliography:* Reports XV, XVII, XVIII, XXII, XXIV, XXVII (inc.) XXX. Bulletins 38, 67, 91, 95, U. S. G. S., Bull. 652. Proc. Colo. Sci. Soc., Vol. XI. South Dakota School of Mines, Bulletin No. 12. Eng. and Min. Jour.-Press, Vol. 113, pp. 666-669, Apr. 22, 1922.

The commercial production of tungsten ores and concentrates in California began in 1905; and has been continuous since, with the exception of 1920-1922 inclusive. The material shipped in 1936 was high-grade sorted ore and concentrates, coming from a single property in Inyo County and two in San Bernardino County. A total of 209 short tons of concentrates averaging 67.5% WO<sub>3</sub> was reported shipped, yielding 236 tons recalcuated to 60% WO<sub>3</sub> valued at \$210,819. The 1936 output showed an increase in both quantity and value as compared with that of 1935, which was 118 tons worth \$194,542.

Quotations in "Metal and Minerals Markets" during 1936 ranged from \$16 to \$17.25 per unit WO<sub>3</sub>, for Chinese wolframite, duty paid, and \$14 to \$16 for domestic scheelite. The highest prices were received at the end of the year. Present (October 1937) prices per unit WO<sub>3</sub> at New York are: Chinese wolframite, duty paid, \$35; scheelite, \$30 to \$32.

Imports of foreign tungsten ores and alloys into the United States during 1936, according to the U. S. Bureau of Foreign and Domestic Commerce totaled 6,648,527 pounds valued at \$1,529,658, compared with 1,587,313 pounds worth \$383,656 in 1935. The Tariff Act of 1930 raised the duty on tungsten ore or concentrates to 50 cents per pound on the metallic tungsten contained therein. Duties are also provided for imported tungsten-bearing alloys.

Tungsten ore has been produced in California principally in the Atolia-Randsburg district in San Bernardino and Kern counties, followed by the Bishop district in Inyo County, with small amounts coming from Nevada County and from the district near Goffs, in eastern San Bernardino. Most of California's tungsten ore is scheelite (calcium tungstate), though wolframite (iron-manganese tungstate) and hüberrite (manganese tungstate) also occur. The deposits at Atolia are the largest and most productive scheelite deposits known.

## Total Tungsten Ore Production of California.

The annual amount and value of tungsten ores and concentrates produced in California since the inception of the industry is given herewith, with tonnages recalculated to 60%  $\text{WO}_3$ :

Year	Tons at 60% $\text{WO}_3$	Value	Year	Tons at 60% $\text{WO}_3$	Value
1905	57	\$18,800	1923	34	\$19,126
1906	485	189,100	1924	781	449,009
1907	287	120,587	1925	573	348,475
1908	105	37,750	1926	441	316,560
1909	577	190,500	1927	398	429,237
1910	457	208,245	1928	150	106,280
1911	387	127,706	1929	120	82,582
1912	572	206,000	1930	26	9,509
1913	559	234,673	1931	148	76,605
1914	420	180,575	1932	261	224,417
1915	962	1,005,467	1933	118	194,542
1916	2,270	4,571,521	1934	236	210,819
1917	2,466	3,079,013	1935		
1918	1,982	2,832,222	1936		
1919	214	219,316			
1920			Totals	15,086	\$15,685,532

\* Annual details concealed under 'Unapportioned.'

## VANADIUM

*Bibliography:* Reports XV, XXVI. Bulletins 67, 91. Proc. Colo. Sci. Soc., Vol. XI. U. S. Bur. of Mines, Bulletin 104.

No commercial production of vanadium has yet been made in California. Occurrences of this metal have been found at Camp Signal, near Goffs, in San Bernardino County, and two companies at one time did considerable development work in the endeavor to open up paying quantities. Some ore carrying lead vanadate has been developed in the 29 Palms, or Washington district, on the line between Riverside and San Bernardino counties, but no shipments reported.

Present New York quotations for ferrovanadium are \$2.70-\$2.90 per pound of vanadium f.o.b. works, and vanadium ore  $27\frac{1}{2}\text{¢}$  per pound  $\text{V}_2\text{O}_5$  contained.

## ZINC

*Bibliography:* State Mineralogist Reports XIV, XV, XVII, XVIII, XX-XXIV, XXVI, XXVII, XXX. Bulletins 38, 67, 91.

The recoverable zinc mined in California during 1936 amounted to 29,740 pounds valued at \$1,487, compared with the 1935 output of 328,013 pounds worth \$14,432. The 1936 output came from Orange and Tulare counties.

The zinc ores of Shasta and Calaveras counties are associated with copper, while those of Inyo, Los Angeles, and San Bernardino are associated principally with lead-silver and zinc-silver ores.

The production of metallic zinc<sup>1</sup> at reduction plants in the United States during 1936 amounted to 534,341 short tons valued at \$53,434,000 of which 329 tons were reduced from foreign ores and 42,209 tons from secondary metal. The 1936 output was an increase over that of 1935, which was 449,284 short tons worth \$39,537,000.

The average price per pound for zinc in 1936 was 5¢ compared with 4¢ in 1935, 4.3¢ in 1934, 4.2¢ in 1933, and 3.0¢ in 1932.

<sup>1</sup> U. S. Bureau of Mines, Mineral Market Report, April 2, 1937.

## Total Zinc Production of California.

Total figures for zinc output of the state are as follows, commercial production dating back only to 1906:

Year	Pounds	Value	Year	Pounds	Value
1906.....	206,000	\$12,566	1922.....	3,034,430	\$172,963
1907.....	177,759	10,598	1923.....	3,060,000	198,900
1908.....	54,000	3,544	1924.....	11,546,602	877,542
1909.....			1925.....	20,447,559	1,533,568
1910.....			1926.....	8,625,004	552,000
1911.....	2,679,842	152,751	1927.....		
1912.....	4,331,391	298,866	1928.....		
1913.....	1,157,947	64,845	1929.....		
1914.....	399,641	20,381	1931.....	149,865	5,314
1915.....	13,043,411	1,617,383	1932.....		
1916.....	15,950,565	2,137,375	1933.....	290,222	12,189
1917.....	11,854,804	1,209,190	1934.....	721,719	31,034
1918.....	5,565,516	506,466	1935.....	328,013	14,432
1919.....	1,384,192	101,046	1936.....	29,740	1,487
1920.....	1,188,009	96,229			
1921.....	846,184	42,309	Totals.....	107,072,463	\$9,672,978



## STRUCTURAL MATERIALS

*Bibliography:* State Mineralogist Reports XII-XXXII (inc.). Bulletin 38. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

As indicated by this subdivision heading, the mineral substances herein considered are those more or less directly used in building and structural work. California is independent, so far as these are concerned, and almost any reasonable construction can be made with materials produced in the State. Chromite, which previous to 1933 was listed under structural materials in the statistical reports of the State Division of Mines, is now transferred to the metals group, thus coinciding with the practice of the United States Bureau of Mines.

This branch of the mineral industry for 1936 was valued at \$38,503,997, as compared with a total of \$18,837,446 for the year 1935. All the materials grouped under this classification showed an increased value in 1936, with the exception of granite, magnesite and sandstone.

In 1936 all counties, with the exception of Sutter, contributed to this structural total. There is not a county in the fifty-eight counties of the State which is not capable of producing at least one of the materials under the classification and in 1926 every county contributed one or more substances to the group.

The following summary shows the value of the structural materials produced in California during the years 1935-1936, with increases or decreases in each instance:

Substance	1935		1936		Increase + Decrease— Value
	Amount	Value	Amount	Value	
Brick and hollow building tile		\$1,855,343		\$2,240,905	\$385,562+
Cement.....	8,086,292 bbls.	10,120,721	13,300,188 bbls.	18,314,589	8,193,868+
Granite.....		339,917		244,243	95,674—
Lime.....	59,731 tons	573,212	64,275 tons	633,678	60,466+
Marble <sup>a</sup> .....		9,884		23,011	13,127+
Sandstone.....		9,268		9,180	88—
Slate.....		40,912		49,818	8,906+
Stone, miscellaneous.....		5,571,041		16,578,238	11,007,197+
Unapportioned.....		317,148		410,335	93,187+
Total values.....		\$18,837,446		\$38,503,997	
Net increase.....					\$19,666,551

<sup>a</sup> Includes onyx and travertine.

<sup>b</sup> Includes bituminous rock, magnesite, tube-mill pebbles.

## ASPHALT

*Bibliography:* State Mineralogist Reports VII, X, XII-XV (inc.), XVII, XVIII. Bulletins 16, 32, 63, 67, 69, 91.

Asphalt was for a number of years accounted for in the statistical reports by the State Mining Bureau, because in the early days of the

oil industry, considerable asphalt was produced from outcroppings of oil sand, and was a separate industry from the production of oil itself. However, at the present time most of the asphalt comes from the oil refineries, which produce a better and more uniform grade; hence, its value is not now included in the mineral total, as to do so would be in part a duplication of the crude petroleum figures. Such natural asphalt as is at present mined is in the form of bituminous sandstones, and is recorded under that designation.

### BITUMINOUS ROCK

*Bibliography:* State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XXI, XXII, XXV, XXVI, XXXI.

This material is essentially an uncemented sandstone which is saturated with and held together by a natural asphaltic constituent, probably the residue from the evaporation of a crude petroleum deposit. Bituminous rock is still used to a limited extent for road dressing in those districts adjacent to available deposits, though the manufacture of asphalt at the oil refineries has almost entirely superseded the direct use of the native material. Some of the Santa Cruz County production is put on the market as a material which can be laid cold. This material is especially applicable and valuable for patch jobs.

During 1936 shipments of bituminous rock were made from Santa Barbara and Santa Cruz counties with a single producer in each. The annual details are concealed under the 'Unapportioned' item so as not to reveal the output of either operator. The total of the 1935 and 1936 yield was 41,681 short tons valued at \$133,344. The 1936 output showed an increase in both amount and value over that of 1935.

#### Bituminous Rock Production of California, by Years.

The following tabulation shows the total amount and value of bituminous rock quarried and sold in California, from the records compiled by the State Mining Bureau, annually since 1887:

Year	Tons	Value	Year	Tons	Value
1887	36,000	\$160,000	1913	37,541	\$78,479
1888	50,000	257,000	1914	66,119	166,618
1889	40,000	170,000	1915	17,789	61,468
1890	40,000	170,000	1916	19,449	66,561
1891	39,962	154,164	1917	5,590	18,580
1892	24,000	72,000	1918	2,561	9,067
1893	32,000	192,036	1919	4,614	18,537
1894	31,214	115,193	1920	5,450	27,825
1895	38,921	121,586	1921	8,298	43,192
1896	49,456	122,500	1922	4,624	13,570
1897	45,470	128,173	1923	2,945	11,780
1898	46,836	137,575	1924	6,040	14,922
1899	40,321	116,097	1925	2,681	10,724
1900	25,306	71,495	1926	3,863	21,577
1901	24,052	66,354	1927	3,515	17,704
1902	33,490	43,411	1928	4,966	33,832
1903	21,944	53,106	1929	3,320	14,360
1904	45,280	175,680	1930	8,525	36,075
1905	24,753	60,436	1931		
1906	16,077	45,204	1932 *	23,653	109,140
1907	24,122	72,835	1933		
1908	30,718	109,818	1934 *	36,793	130,301
1909	34,123	116,436	1935)		
1910	87,547	165,711	1936 *	41,681	133,344
1911	75,125	117,279			
1912	44,073	87,467	Totals	1,310,807	\$4,139,212

\* Annual details concealed under 'Unapportioned.'

## BRICK AND HOLLOW TILE

*Bibliography:* State Mineralogist Reports VIII, X, XII–XV (inc.), XVII–XXVIII (inc.), XXXII. Bulletins 38, 99. Preliminary Report No. 7. Cal. Jour. of Development, June, 1925, pp. 5–6.

Bricks of many varieties and in important quantities are annually produced in California, as might be expected in a state with such diversified and widespread mineral resources. The varieties include common, fire, pressed, glazed, enamel, fancy, vitrified, sand-lime, and others. Not only do the plants here supply practically all of our own requirements in these products, but considerable quantities are shipped to contiguous territory and certain products are shipped over a much wider radius.

We also include under this heading the various forms of hollow building 'tile' or blocks. The application of this tile to residence construction as well as to other structures has grown, though their total output for 1936 showed a decrease in value and tonnage as compared with the 1935 production.

The 1936 output of all kinds of brick showed an increased value of 21 per cent and an increased amount of 76 per cent as compared with that of 1935. The 1936 production consisted of 106,012 M of common brick valued at \$889,868; 18,087 M of fire brick valued at \$973,354; 7,568 M of glazed, pressed, fancy, and vitrified paving-brick valued at \$243,258; and 16,081 tons of hollow building tile valued at \$134,425; which gave a total value for the year for brick and hollow building tile of \$2,240,905. The 1935 output had a total value of \$1,855,343.

Los Angeles County had the largest output of brick and building tile in 1936 with fifteen companies producing 60,811 M of common brick worth \$427,704; 7,273 M of fire brick worth \$443,773; 4,710 M of fancy glazed and pressed brick worth \$136,361; and 4,517 tons of hollow building tile worth \$32,005. Alameda County had four operating plants by three companies with an output having a total value of \$146,730; Contra Costa County with three operating plants had a production with a total value of \$423,887; and Sacramento with three plants, produced an output worth \$116,453. There were two operating plants each in Kern, San Diego, and Santa Clara counties; and one each in Amador, Fresno, Humboldt, Marin, Orange, Placer, Riverside, San Bernardino, San Luis Obispo, Santa Barbara, Tulare, and Ventura counties.



## Brick and Hollow Tile Production of California, by Years.

Record of brick production in the State has been kept since 1893 by this Bureau, the figures for hollow building 'tile' or blocks being also included since 1914. The annual and total figures, for amount and value, are given in the following table:

Year	Brick, M	Hollow building blocks, tons	Value
1893	103,900		\$801,750
1894	81,675		457,125
1895	131,772		672,360
1896	24,000		524,740
1897	97,468		563,240
1898	100,102		571,362
1899	125,950		754,730
1900	137,191		905,210
1901	130,766		860,488
1902	169,851		1,306,215
1903	214,403		1,999,546
1904	281,750		1,994,740
1905	286,618		2,273,786
1906	277,762		2,538,848
1907	362,167		3,438,951
1908	332,872		2,506,495
1909	333,846		3,059,929
1910	340,883		2,934,731
1911	327,474		2,638,121
1912	337,233		2,940,290
1913	358,754		2,915,350
1914	270,791		2,288,227
1915	180,538		1,678,756
1916	206,960		2,096,570
1917	192,269	29,348	2,532,721
1918	136,374	34,818	2,363,481
1919	156,328	36,026	3,087,067
1920	245,842	99,208	5,704,393
1921	238,022	67,100	5,570,875
1922	374,853	105,909	7,994,991
1923	397,754	122,534	9,738,082
1924	456,716	114,469	9,137,908
1925	361,094	105,491	7,503,976
1926	388,048	90,332	7,026,124
1927	374,111	75,116	6,516,077
1928	272,443	66,277	5,694,770
1929	327,011	66,713	5,607,410
1930	267,019	68,047	4,205,460
1931	151,545	51,988	2,560,415
1932	90,683	27,098	1,605,086
1933	76,905	25,814	1,520,481
1934	66,738	17,534	1,644,661
1935	76,521	21,309	1,855,343
1936	131,667	16,081	2,240,905
Totals	10,296,669	1,241,212	\$136,931,786

## CEMENT

*Bibliography:* State Mineralogist Reports VIII, IX, XII, XIV, XV, XVII, XVIII, XXI-XXVIII (inc.) XXXII. Bulletin 38.

During 1936 there was a production of 13,300,188 barrels of cement in California, valued at \$18,314,589 f.o.b. plant, of which 4,394,082 barrels came from northern California plants and 8,906,106 barrels came from southern California plants. The 1936 output was an increase over that of 1935 which was 8,086,292 barrels worth \$10,120,721.

Shipments during 1936 were made from ten plants in nine counties to the extent of 12,994,393 barrels valued at \$18,090,256, as compared with 8,167,595 worth \$11,065,516. There were in operation during the year, five plants in northern California, one each in Calaveras, Contra Costa, Merced, San Mateo, Santa Cruz counties, which shipped 4,283,698

barrels of cement; and five plants in southern California, two in San Bernardino County, and one each in Kern, Los Angeles<sup>1</sup> and Riverside counties, which shipped 8,710,695 barrels of cement. There were 2168 men employed in the above plants during the year 1936.

#### Cement Production of California, by Years.

'Portland' cement was first commercially produced in California in 1891; though in 1860 and for several years following, a natural hydraulic cement from Benicia was utilized in building operations in San Francisco.

"The Benicia Cement Company in 1859-60 was turning out 50 to 100 barrels of cement a day and San Francisco was using about 12,000 barrels a year. The mill price of the product was then \$4 a barrel. By 1865, the San Francisco rate of consumption had increased to 100,000 barrels yearly, brick buildings largely taking the place of frame structures, and the price of cement had fallen to \$2.50 a barrel, about the same as it is today."<sup>2</sup>

The growth of the industry became rapid after 1902; since which time cement has continued to be an important factor in the industrial life of the State. Although the total cement figures, to date, are not of the same magnitude as those for gold and petroleum, it is interesting to note that the value of California's cement yield in the period 1920-1931 annually exceeded the value of her gold output.

#### Cement Production of California, by Years

Year	Barrels	Value	Year	Barrels	Value
1891.....	5,000	\$15,000	1915.....	4,918,275	\$6,044,950
1892.....	5,000	15,000	1916.....	5,299,507	6,210,293
1893.....			1917.....	5,790,734	7,544,282
1894.....	8,000	21,600	1918.....	4,772,921	7,969,909
1895.....	16,383	32,556	1919.....	4,645,289	8,591,990
1896.....	9,500	28,250	1920.....	6,709,160	14,962,945
1897.....	18,000	66,000	1921.....	7,404,221	18,072,120
1898.....	50,000	150,000	1922.....	8,962,135	16,524,056
1899.....	60,000	180,000	1923.....	10,825,405	25,999,203
1900.....	52,000	121,000	1924.....	11,655,131	23,225,850
1901.....	71,800	159,842	1925.....	13,206,630	25,043,335
1902.....	171,000	423,600	1926.....	13,797,173	25,269,678
1903.....	640,868	968,727	1927.....	14,661,783	26,474,935
1904.....	969,538	1,539,807	1928.....	13,625,231	24,463,287
1905.....	1,265,553	1,791,916	1929.....	12,794,729	21,038,565
1906.....	1,286,000	1,941,250	1930.....	9,831,938	14,575,731
1907.....	1,613,563	2,585,577	1931.....	7,693,712	11,510,655
1908.....	1,629,615	2,359,692	1932.....	5,657,549	7,967,107
1909.....	3,779,205	4,969,437	1933.....	7,284,031	10,331,395
1910.....	5,453,193	7,485,715	1934.....	8,936,085	12,445,616
1911.....	6,371,369	9,085,625	1935.....	8,086,292	10,120,721
1912.....	6,198,634	6,074,661	1936.....	13,300,188	18,314,589
1913.....	6,167,806	7,743,024			
1914.....	5,109,218	6,558,148	Totals.....	240,809,364	\$397,017,629

<sup>1</sup> The plant in Los Angeles County grinds clinker coming from other counties, therefore the crude material is credited to the point of origin.

<sup>2</sup> Monthly Review of Mercantile Trust Co. of Calif., Vol. XIII, No. 3, p. 55, Mar. 1924.

## GRANITE

*Bibliography:* State Mineralogist Reports X, XII-XXVI (inc.), XXVIII, XXXI. Bulletin 38.

The 1936 output of granite in California consisted of 96,362 cu. ft. of building stone valued at \$127,277; 60,727 cu. ft. of monumental stone valued at \$87,707; 9,345 linear ft. of curbing valued at \$16,145, and 115,015 cu. ft. of unclassified material, including a small amount of tuff and volcanic rock, which was used as building stone, and for flagstone, having a value of \$13,112; giving a total value for the year's yield at \$244,243. This was a decrease over the 1935 total value which was \$339,917. The 1936 material came from twenty quarries in eleven counties, five of which were in San Diego County, three in Sonoma County, two each in Fresno, Madera, and Placer counties; and one each in Lassen, Los Angeles, Mariposa, Nevada, Plumas, and Tulare counties. The material from Sonoma county was tuff.

So far as possible, granite production has been segregated in the statement herewith into the various uses to which the product was put. It will be noted, however, that a portion of the output has been entered under the heading 'Unclassified.' This is necessary because of the fact that some of the producers have no way of telling to what specific use their stone was put after they had quarried and sold the same in the rough.

**Varieties.**

For building purposes, the granite found in California, particularly the varieties from Raymond in Madera County, Rocklin in Placer County and near Porterville in Tulare County, are unexcelled by any similar stone found elsewhere. The quantities available, notably at Raymond and Porterville, are unlimited. Most of California's 'granite,' particularly that found in the Sierra Nevada Mountains, is technically 'granodiorite' (that is, both plagioclase and orthoclase feldspars are present).

Granites of excellent quality for building and ornamental purposes are also quarried in Riverside, San Bernardino, and San Diego counties. Near Lakeside, San Diego County, there is a fine-grained, 'silver gray' granite of uniform texture and color, especially suited for monumental and ornamental work.

The Fresno County stone is a dark, hornblende diorite, locally called 'black granite,' whose color permits of a fine contrast of polished and unpolished surfaces, making it particularly suitable for monumental and decorative purposes. There is also a similar 'black granite' in Tulare County, near Success.



**Granite Production of California, by Years.**

The value of granite produced, annually, since 1887 has been as follows:

Year	Value	Year	Value
1887.....	\$150,000	1913.....	\$981,277
1888.....	57,000	1914.....	628,786
1889.....	1,329,018	1915.....	227,928
1890.....	1,200,000	1916.....	535,339
1891.....	1,300,000	1917.....	221,997
1892.....	1,000,000	1918.....	139,861
1893.....	531,322	1919.....	220,743
1894.....	228,816	1920.....	495,732
1895.....	224,329	1921.....	725,901
1896.....	201,004	1922.....	676,643
1897.....	188,024	1923.....	760,081
1898.....	147,732	1924.....	1,211,046
1899.....	141,070	1925.....	1,853,859
1900.....	295,772	1926.....	655,332
1901.....	519,285	1927.....	1,398,143
1902.....	255,239	1928.....	763,996
1903.....	678,670	1929.....	1,169,271
1904.....	467,472	1930.....	855,477
1905.....	353,837	1931.....	636,741
1906.....	344,083	1932.....	398,676
1907.....	373,376	1933.....	183,706
1908.....	512,923	1934.....	249,083
1909.....	376,834	1935.....	339,917
1910.....	417,898	1936.....	244,243
1911.....	355,742		
1912.....	362,975	Total.....	\$27,586,499

**LIME**

*Bibliography:* Reports XIV, XV, XVII-XXIX (inc.), Bulletin 38.

In California during 1936 there was an output of lime amounting to 64,275 short tons valued at \$633,678, coming from two plants each in El Dorado, San Bernardino, and Santa Cruz counties; and one each in Alameda and Tuolumne counties. The above figures showed an increase in both amount and value over those of 1935 which were 59,731 tons worth \$573,212.

So far as we have been able to segregate the data, these figures include mainly only such lime as is used in building operations; though they do include a small proportion of calcined lime employed in agriculture and the chemical industries, the figures for which were not separable. A portion is hydrated lime. Limestone utilized in sugar making, for smelter flux, as a fertilizer, and other special industrial uses, is classified under 'Industrial Materials.' That consumed in cement manufacture is included in the value of cement.

## Lime Production of California, by Years.

The following tabulation gives the amounts and value of lime produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. The figures for quantity have been recalculated from 'barrels', as shown in the earlier reports, to 'tons' for the years 1894-1922 (inc.):

Year	Tons	Value	Year	Tons	Value
1894.....	37,350	\$318,700	1917.....	50,073	\$311,380
1895.....	39,776	386,094	1918.....	43,684	461,315
1896.....	30,275	261,505	1919.....	42,070	552,043
1897.....	28,780	252,900	1920.....	46,314	557,232
1898.....	29,786	254,010	1921.....	46,353	610,619
1899.....	29,985	314,575	1922.....	57,875	671,747
1900.....	31,252	283,699	1923.....	70,894	788,834
1901.....	31,738	334,688	1924.....	62,029	703,355
1902.....	44,866	369,616	1925.....	61,922	685,528
1903.....	49,659	418,280	1926.....	63,568	670,837
1904.....	57,945	571,749	1927.....	60,498	631,497
1905.....	61,700	555,322	1928.....	56,616	547,919
1906.....	68,927	763,060	1929.....	42,834	417,101
1907.....	68,422	756,376	1930.....	47,662	452,084
1908.....	39,639	379,243	1931.....	36,189	360,523
1909.....	52,075	577,824	1932.....	27,510	254,223
1910.....	47,951	477,683	1933.....	33,425	271,619
1911.....	42,959	390,988	1934.....	32,500	309,765
1912.....	52,212	464,440	1935.....	59,731	573,212
1913.....	61,344	528,547	1936.....	64,275	633,678
1914.....	43,996	378,663			
1915.....	35,653	286,304			
1916.....	49,364	390,475			
			Totals.....	2,041,776	\$20,179,252

## MAGNESITE

*Bibliography:* State Mineralogist Reports XII-XV (inc.), XVII-XXVII (inc.), XXX, XXXI. Bulletins 38, 79, 91. U. S. Geol. Surv., Bulletins 355, 540. Min. Res. 1913, Pt. II, pp. 450-453. Min. & Sci. Press, Vol. 114, p. 237. "Magnesite"—Hearings before Comm. on Ways and Means, House of Repr., on H. R. 5218, June 16, 17, and July 17, 1919. Eng. Soc. W. Penn., Proc. 1913, Vol. 29, pp. 305-388, 418-444. Eng. & Min. Jour.-Pres., Vol. 114, July 29, and Dec. 2, 1922. U. S. Tariff Comm., "Crude and Caustic Calcined Magnesite. A Preliminary Statement of Information," May 19, 1926.

The production of crude magnesite in California during 1936 came from a single property each in Santa Clara and Stanislaus counties, both being operated by the same company. The annual details are concealed under the 'Unapportioned' item to conceal the output of this single operator. Practically all was shipped in the calcined form.

The output for 1936 showed an increase in both quantity and value over that of 1935. The 1934-1935 production showed a total of 62,509 short tons of crude magnesite valued at \$413,228, of which only a small amount was sold as such. Most of this material was calcined. The operators' reports showed that a total of 27,276 short tons of calcined material valued at \$659,619 rail shipping point, was made during 1934-1935, and was both dead-burned and periclase for refractories, and material for the plastic trade. From two to two and one-half tons of crude material are required to make one ton of calcined. The average price of crude magnesite reported in 1936 was \$7.25 per ton, com-

pared with \$6.70 per ton in 1935, \$6.50 per ton in 1934, \$5.60 per ton in 1933, \$10.00 per ton in 1932, and \$8.45 per ton in 1931.

In California the known deposits are mostly in the metamorphic rocks of the Coast Ranges and the Sierra Nevada, being associated with serpentine areas. The notable exceptions are the sedimentary deposits at Bissell in Kern County and at Afton in San Bernardino County. Several thousand tons have been shipped from the Bissell deposit; and small shipments have been made from the Afton property.

Imports.

The tariff act of 1930 placed the following import duties on magnesite: Crude magnesite 15/32¢ per lb., caustic-calcined magnesite 15/16¢ per lb., dead-burned and grain magnesite, not suitable for manufacture into oxychloride cements, 23/40¢ per lb.; magnesite brick ¾¢ per lb., and 10 per cent ad valorem. The figures of imports for 1936, as published by the U. S. Bureau of Foreign and Domestic Commerce, show a total of 44,863 short tons valued at \$713,371, as compared with 26,166 tons worth \$466,990 in 1935.

Total Magnesite Production of California.

The first commercial production of magnesite in California was made in the latter part of 1886 from the Cedar Mountain district,<sup>1</sup> southeast of Livermore, Alameda County. Shipments amounting to 'several tons' or 'several carloads' were sent by rail to New York; but there is apparently no exact record of the amount for that first year. The statistical records of the State Mining Bureau began with the year 1887, and the table herewith shows the figures for amount and value, annually, from that time. Shipments of magnesite from Napa County began in 1891 from the Snowflake Mine; from the Red Mountain deposits in Santa Clara County, in 1899; and from Tulare County in 1900.

Total Magnesite Production of California

Year	Tons	Value	Year	Tons	Value
1887.....	600	\$9,000	1913.....	9,632	\$77,056
1888.....	600	9,000	1914.....	11,438	114,380
1889.....	600	9,000	1915.....	30,271	283,461
1890.....	600	9,000	1916.....	154,052	1,311,893
1891.....	1,500	15,000	1917.....	209,618	1,976,227
1892.....	1,500	15,000	1918.....	83,974	803,492
1893.....	1,093	10,930	1919.....	44,696	452,094
1894.....	1,440	10,240	1920.....	83,695	1,033,491
1895.....	2,200	17,000	1921.....	47,837	511,102
1896.....	1,500	11,000	1922.....	55,637	594,665
1897.....	1,143	13,671	1923.....	73,963	946,643
1898.....	1,263	19,075	1924.....	67,236	900,183
1899.....	1,280	18,480	1925.....	64,623	872,944
1900.....	2,252	19,333	1926.....	50,915	587,642
1901.....	4,726	43,057	1927.....	46,093	577,887
1902.....	2,830	20,655	1928.....	45,645	501,590
1903.....	1,361	20,515	1929.....	47,269	488,014
1904.....	2,850	9,298	1930.....	38,681	388,472
1905.....	3,933	16,221	1931.....	21,576	182,283
1906.....	4,032	40,320	1932.....	40,303	282,325
1907.....	6,405	57,720	1933.....	62,509	413,228
1908.....	10,582	80,822	1934.....	*	*
1909.....	7,942	62,588	1935.....	*	*
1910.....	16,570	113,887	1936.....	*	*
1911.....	8,858	67,430			
1912.....	10,512	105,120	Totals.....	1,388,315	\$14,122,434

\* Combined under "Unapportioned."

<sup>1</sup> See U. S. Geol. Surv.; Mineral Resources of U. S., 1886, pp. 6 and 696.



## MARBLE

*Bibliography:* State Mineralogist Reports XII-XV (inc.), XVII-XXX (inc.). Bulletin 38. U. S. Bur. of Mines Bull. 106.

The 1936 production of marble in California was valued at \$23,011 (including some onyx and travertine from Inyo, Solano, and San Bernardino counties, and a small amount of limestone used as building stone and flagstone coming from a single operator each in Los Angeles, San Luis Obispo, and Santa Barbara counties). The marble came from a single quarry in Tuolumne County. The 1936 output showed an increase in value over that of 1935, which was worth \$9,884.

California has many beautiful and serviceable varieties of marble, suitable for almost any conceivable purpose of construction or decoration. In the decorative class are deposits of onyx marble of beautiful coloring and effects. There is also serpentine marble suitable for electrical switchboard use.

#### Marble Production of California, by Years.

Data on annual production since 1887, as compiled by the State Mining Bureau, follows. Previous to 1894 no records of amounts were preserved.

Total Production of Marble in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1887.....		\$5,000	1913.....	41,654	\$113,282
1888.....		5,000	1914.....	25,436	48,832
1889.....		87,030	1915.....	22,186	41,518
1890.....		80,000	1916.....	25,954	50,280
1891.....		100,000	1917.....	21,755	62,950
1892.....		115,000	1918.....	<sup>a</sup> 17,428	49,898
1893.....		40,000	1919.....	25,020	74,482
1894.....	38,441	98,326	1920.....	<sup>b</sup> 29,531	92,899
1895.....	14,864	56,566	1921.....	30,232	98,395
1896.....	7,889	32,415	1922.....	38,321	127,792
1897.....	4,102	7,280	1923.....	28,015	124,919
1898.....	8,050	23,594	1924.....	<sup>b</sup> 61,579	140,253
1899.....	9,682	10,550	1925.....	35,664	116,105
1900.....	4,103	5,891	1926.....	34,806	119,999
1901.....	2,945	4,630	1927.....	<sup>b</sup> 42,308	103,689
1902.....	19,305	37,616	1928.....	<sup>b</sup> 34,324	82,190
1903.....	84,624	97,354	1929.....	<sup>b</sup> 72,881	93,661
1904.....	55,401	94,208	1930.....	<sup>b</sup> 65,775	82,194
1905.....	73,303	129,450	1931.....	<sup>b</sup> 37,776	81,760
1906.....	31,400	75,800	1932.....	<sup>b</sup> 25,506	42,505
1907.....	37,512	118,066	1933.....	<sup>b</sup> 9,039	23,178
1908.....	18,653	47,665	1934.....	<sup>b</sup> 7,185	10,759
1909.....	79,600	238,400	1935.....	<sup>b</sup>	9,884
1910.....	18,960	50,200	1936.....	<sup>b</sup>	23,011
1911.....	20,201	54,103			
1912.....	27,820	74,120	Total.....		\$3,502,699

<sup>a</sup> Includes onyx and serpentine.

<sup>b</sup> Includes onyx and travertine.

#### ONYX and TRAVERTINE

*Bibliography:* State Mineralogist Reports XII-XV (inc.), XVII, XVIII, XXI, XXIII, XXXI. Bulletin 38.

Onyx and travertine are known to exist in a number of places in California, but there has been only a small and irregular production since the year 1896. In 1936 there were two producers of onyx and travertine in Solano County and small amounts were shipped from Inyo and San Bernardino counties. The 1936 output showed an

increase in both quantity and value over that of 1935, the figures of which are combined with marble. This material is used in terrazzo, auto gear-shift handles, bases for fountain-pen desk sets, and other ornamental purposes.

**Onyx Production of California, by Years.**

Production by years has been as follows:

Year	Value	Year	Value
1887.....	•	1923.....	\$2,510
1888.....	\$900	1924.....	•
1889.....	900	1925.....	16,120
1890.....	900	1926.....	7,575
1891.....	1,500	1927.....	•
1892.....	2,400	1928.....	•
1893.....	1,800	1929.....	•
1894.....	27,000	1930.....	•
1895.....	20,000	1931.....	•
1896.....	12,000	1932.....	•
1918.....	24,000	1933.....	•
1919.....	•	1934.....	•
1920.....	•	1935.....	•
1921.....	1,294	1936.....	•
1922.....	3,320		
		Total value.....	\$122,219

\* See under Marble

**SANDSTONE**

*Bibliography:* State Mineralogist Reports XII-XV, XVII, XVIII, XXI, XXIII, XXVI-XXVIII (inc.). Bulletin 38. U. S. Bur. of Mines, Bull. 124.

An unlimited amount of high-grade sandstone is available in California, but the wide use of concrete in buildings of every character, as well as the popularity of a lighter-colored building stone, has curtailed production in this branch of the mineral industry during recent years almost to the vanishing point. In 1936 a total of 24,705 cu. ft. of sandstone valued at \$9,180 was quarried in California, and came from five properties in Los Angeles, Monterey, and San Luis Obispo counties; compared with 38,426 cu. ft. valued at \$9,268 for 1935.

Practically all of the material was flagstone which is used in garden walks, fountains, walls and fireplaces to give effect to Spanish and English types of homes. The material reported from Monterey and San Luis Obispo counties is in reality an indurated shale of the Monterey series, of a cream color and utilized as a building stone. Part of the material coming from Los Angeles County was schist and indurated shale.

Sandstone Production of California, by Years.

Amount and value, so far as contained in the records of this Bureau, are presented herewith, with total value from 1887 to date:

Year	Cubic feet	Value	Year	Cubic feet	Value
1887		\$175,000	1913	62,227	\$27,870
1888		150,000	1914	111,691	45,322
1889		175,598	1915	63,350	8,438
1890		100,000	1916	17,270	10,271
1891		100,000	1917	31,090	7,074
1892		50,000	1918	900	400
1893		26,314	1919	5,400	3,720
1894		113,592	1920	10,500	2,300
1895		35,373	1921	10,150	2,112
1896		28,379	1922	900	1,100
1897		24,086	1923	7,000	13,000
1898		46,384	1924	6,700	3,600
1899	56,264	103,384	1925	14,704	14,362
1900	378,468	254,140	1926	34,100	17,500
1901	266,741	192,132	1927	22,900	205,400
1902	212,123	142,506	1928	134,100	43,250
1903	353,002	585,309	1929	177,655	49,881
1904	363,487	567,181	1930	160,704	56,404
1905	302,813	483,268	1931	110,244	30,960
1906	182,076	164,068	1932	41,793	13,286
1907	159,573	148,148	1933	25,980	10,888
1908	93,301	55,151	1934	21,738	14,245
1909	79,240	37,032	1935	38,426	9,268
1910	165,971	80,443	1936	24,705	9,150
1911	255,313	127,314			
1912	66,487	22,574	Total value		\$4,587,107

SERPENTINE

*Bibliography:* State Mineralogist Report XV. Bulletin 38.

Serpentine has not been produced in California to a very large extent at any time. A single deposit, that on Santa Catalina Island, has yielded the principal output to date. Some material was shipped from there in 1917 and 1918, being the only output recorded since 1907. It was used for decorative building purposes and for electrical switchboards. As there was but a single operator, the figures were combined with those of marble output for those years.

Serpentine Production of California, by Years.

The following table shows the amount and value of serpentine from 1895 as recorded by this bureau:

Serpentine Production in California, by Years

Year	Cubic feet	Value	Year	Cubic feet	Value
1895	4,000	\$4,000	1904	200	\$2,310
1896	1,500	6,000	1905		
1897	2,500	2,500	1906	847	1,694
1898	750	3,000	1907	1,000	3,000
1899	500	2,000	1917	<sup>a</sup>	<sup>a</sup>
1900	350	2,000	1918	<sup>b</sup>	<sup>b</sup>
1901	89	890	1919		
1902	512	5,065			
1903	99	800	Totals	12,347	\$33,259

<sup>a</sup> Under 'Unapportioned.'  
<sup>b</sup> See under Marble.



## SLATE

*Bibliography:* State Mineralogist Reports XV, XVIII, XXIV, XXVIII. Bulletin 38. U. S. Geol. Surv., Bull. 586. U. S. Bur. of Mines, Bull. 218.

Slate was first produced in California in 1889. Up to and including 1910 such production was continuous, but since then it has been irregular. Large deposits of excellent quality are known in the State, especially in El Dorado, Calaveras and Mariposa counties, but the demand has been light owing principally to competition of cheaper roofing materials.

The production of slate in California during 1936 amounted to 12,252 short tons and 65 squares having a total value of \$49,818 f. o. b. quarry and came from properties in Calaveras, El Dorado, Los Angeles, Inyo, and Tuolumne counties. The 1936 figures showed an increase in both amount and value over those of 1935 which were 8066 tons and 40 squares having a total value of \$40,912. Practically all the slate was crushed and used for roofing granules. The slate shingles came from Calaveras County, and that from Los Angeles County was sold as flagstone.

## Total Production of Slate in California.

A complete record of amount and value of slate produced in California follows:

Year	Squares	Value	Year	Squares	Value
1889.....	4,500	\$18,080	1910.....	1,000	\$9,000
1890.....	4,000	24,000	1911.....		
1891.....	4,000	24,000	1915.....	1,000	5,000
1892.....	3,500	21,000	1916.....		
1893.....	3,000	21,000	1920.....	8	80
1894.....	1,800	11,700	1921.....		
1895.....	1,350	9,450	1922.....	200	2,400
1896.....	500	2,500	1923.....		
1897.....	400	2,800	1926.....	<sup>a</sup>	7,371
1898.....	400	2,800	1927.....	<sup>b</sup> 2,686	17,960
1899.....	810	5,900	1928.....	<sup>b</sup> 4,075	31,263
1900.....	3,500	26,250	1929.....	<sup>b</sup> 8,220	71,347
1901.....	5,100	38,250	1930.....		
1902.....	4,000	30,000	1931.....	<sup>b</sup> 8,234	55,182
1903.....	10,000	70,000	1932.....		
1904.....	6,000	50,000	1933.....	<sup>b</sup> 5,343	31,958
1905.....	4,000	40,000	1934.....	<sup>b</sup> 5,065	24,245
1906.....	10,000	100,000	1935.....	<sup>a</sup>	40,912
1907.....	7,000	60,000	1936.....	<sup>a</sup>	49,818
1908.....	6,000	60,000			
1909.....	6,961	45,660			
1910.....			Total value.....		\$1,013,935

\* Annual details concealed under 'Unapportioned.'

<sup>a</sup> Quantity not shown as both 'squares' and 'tons' included.

<sup>b</sup> Tons.

## MISCELLANEOUS STONE

*Bibliography:* State Mineralogist Reports XII-XXVIII (inc.), XXXI-XXXII. Bulletin 38; also annual statistical bulletins from 1915 to date.

'Miscellaneous stone' is the name used throughout this report as the title for that branch of the mineral industry covering crushed rock

of all kinds, paving blocks, sand and gravel, and pebbles for grinding mills. The foregoing are very closely related from the standpoint of the producer; therefore it has been found to be most satisfactory to group these items as has been done in recent reports of this Bureau. So far as it has been possible to do so, crushed rock production has been subdivided into the various uses to which the product was put. It will be noted, however, a very large percentage of the output has been tabulated under the heading 'Unclassified.' This is necessary because of the fact that many of the producers have no way of telling to what specific use their rock was put (or at least the proportions to each use) after they have quarried and sold the same to distributors and contractors.

In addition to amounts produced by commercial firms, both corporations and individuals, there is hardly a county in the State but uses more or less gravel and broken rocks on its roads. Of much of this, particularly in the country districts, there is no definite record kept.

During 1936 the output of sand and gravel and that of crushed rock showed an increase in both amount and value over that of the previous year. There was a total value of \$16,578,238 for 'miscellaneous stone' during 1936, compared with \$5,571,041 for 1935. As in the past, Los Angeles County led in the annual output of these products, its 1936 yield being worth \$8,542,619; Alameda County second with an output worth \$1,222,909; Sacramento County third with a yield of \$449,373; followed in turn by Contra Costa, Napa, Ventura, Riverside, Santa Clara, San Diego, San Bernardino, and San Benito counties.

#### **Paving Blocks.**

During 1936 there were no paving blocks reported produced in California.

There was a small output of paving blocks in California during 1934 coming from a single property each in Napa and Sacramento counties. The annual details are concealed under the 'Unapportioned' item so as not to reveal production of either operator.

The paving block industry has decreased materially of recent years, practically to the vanishing point, because of the increased construction of smoother pavements demanded by motor vehicle traffic. The blocks made in Solano County were of basalt; those from Sonoma are of basalt, andesite, and some trachyte, while those from Madera, Placer, Riverside, San Bernardino, and San Diego are of granite; and those from San Mateo County a sandstone.

The amount and value of paving block production, annually, since 1887 has been as follows:

Year	Amount M	Value	Year	Amount M	Value
1887	*10,000	\$350,000	1912	11,018	\$578,355
1888	10,500	367,500	1913	6,364	363,505
1889	7,303	297,236	1914	6,053	270,598
1890	7,000	245,000	1915	3,285	171,092
1891	5,000	150,000	1916	1,322	54,362
1892	*3,000	96,000	1917	938	38,567
1893	2,770	96,950	1918	372	17,000
1894	2,517	66,981	1919	27	1,350
1895	2,332	73,338	1920	63	3,155
1896	4,161	77,584	1921	4	280
1897	1,711	35,235	1922	72	3,924
1898	1,144	21,725	1923	15	880
1899	305	7,861	1924	11	935
1900	1,192	23,775	1925	27	1,350
1901	1,920	41,075	1926		
1902	3,502	112,437	1927	41	2,057
1903	4,854	134,642	1928	25	1,658
1904	3,977	161,752	1929		
1905	3,408	134,347	1930		
1906	4,203	173,432	1931	66	5,900
1907	4,604	199,347	1932		
1908	7,660	334,780	1934	2	75
1909	4,503	199,803	1935		
1910	4,434	198,916			
1911	4,141	210,819	Totals	135,840	\$5,325,578

\* Figures for 1887-1892 (inc.) are for Sonoma County only, as none are available for other counties during that period though Solano County quarries were then also quite active.  
\* Annual details concealed under 'Unapportioned.'

Grinding-Mill Pebbles.

The 1935-1936 output of grinding-mill pebbles in California is combined under the 'Unapportioned' item to conceal the production of a single operator in Siskiyou County.

The amount and value of grinding-mill pebbles, annually, follows:

Year	Tons	Value
1915	340	\$2,810
1916	20,232	107,567
1917	21,450	90,538
1918	8,628	61,268
1919	2,607	19,272
1920	2,104	17,988
1921	247	1,418
1922	1,571	7,628
1923	2,650	14,936
1924	434	2,969
1925	215	1,385
1926	102	612
1927	288	1,800
1928	372	2,408
1929 } *		
1930 } *	166	1,225
1931 } *		
1932 } *	25	211
1933 } *		
1934 } *	300	3,018
1935 } *		
1936 } *	961	8,356
Totals	62,692	\$275,409

\* Annual details concealed under 'Unapportioned.'



## Sand and Gravel.

A considerable part of the gravel excavated is passed through grading and washing plants, and the material over 2 inches in size is crushed. Much of it is utilized in concrete mixtures. Most of the gravel used for road surfacing and repairs as well as that for railroad ballast is creek-run or pit-run material which is spread upon the roads without undergoing any grading or washing.

The distribution of the 1936 output of sand and gravel by counties is given in the following table:

<i>County</i>	<i>Tons</i>	<i>Value</i>
Alameda	1,541,348	\$924,958
Amador	22,884	29,277
Butte	69,021	34,822
Calaveras	10,315	7,643
Colusa	51,335	14,206
Contra Costa	146,353	81,867
Del Norte	25,585	11,622
El Dorado	50,115	18,787
Fresno	117,203	94,065
Glenn	332,148	114,246
Humboldt	107,623	37,829
Imperial	107,573	79,835
Kern	121,271	66,646
Lake	47,282	35,769
Lassen	35,077	19,256
Los Angeles	4,074,408	1,813,003
Madera	36,970	31,990
Mariposa	42,936	25,567
Mendocino	102,756	35,521
Merced	45,700	20,775
Modoc	21,238	10,373
Monterey	153,605	127,959
Napa	6,110	3,342
Nevada	13,845	6,018
Orange	212,979	155,302
Placer	5,415	4,105
Plumas	24,890	7,495
Riverside	454,533	154,823
Sacramento	265,710	195,544
San Benito	16,600	6,333
San Bernardino	393,833	197,789
San Diego	261,330	274,345
San Joaquin	268,302	129,923
San Luis Obispo	14,416	9,416
Santa Barbara	71,163	48,350
Santa Clara	403,726	167,529
Shasta	24,711	17,974
Siskiyou	83,970	39,135
Stanislaus	176,484	104,098
Trinity	11,484	7,867
Tulare	154,099	76,945
Tuolumne	5,385	6,615
Ventura	538,946	353,893
Yolo	143,264	49,239
Yuba	58,486	37,922
Alpine, Inyo, Kings, Marin, Mono, San Mateo, Santa Cruz, Sierra, Solano, Sonoma, Tehama *	569,685	314,695
Totals	11,442,112	\$6,004,713

\* Combined to conceal output of individual operators in each.

Included in the above is a total of 49,887 tons of molding sand valued at \$124,333 coming from two properties in Contra Costa County; and one each in Alameda, Monterey, Riverside, Sacramento, San Diego, San Luis Obispo, San Mateo, and Ventura counties. The 1936 yield showed an increase compared with 1935 which was 19,954 tons worth \$52,924.

**Crushed Rock.**

To list the kinds and varieties of rock utilized commercially under this heading would be to run almost the entire gamut of the classification scale. Much depends on the kind available in a given district. Those which give the most satisfactory service are the basalts and other hard, dense, igneous rocks which break with sharp, clean edges. In many localities, river-wash boulders form an important source of such material. In such cases, combined crushing and washing plants obtain varying amounts of sand and gravel along with the crushed sizes. In Sacramento and Butte counties the tailings piles from the gold dredgers are the basis of like operations.

The values given are based on the selling price, f.o.b. cars, barges, or trucks, at the quarry.

## MISCELLANEOUS STONE

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County	Macadam and ballast		Rubble and riprap		Concrete		Unclassified		Totals	
	Tons	Value	Tons	Value	Tons	Value	Tons	Value	Tons	Value
Alameda.....	90,507	\$78,800	-----	-----	86,817	\$82,210	a 176,612	\$136,041	353,936	\$297,951
Butte.....	88,637	56,960	-----	-----	*	*	a 80,959	54,162	169,566	111,122
Del Norte.....	-----	-----	-----	-----	500	625	-----	-----	500	625
El Dorado.....	51,290	46,805	*	*	*	*	-----	-----	51,290	46,805
Glenn.....	18,475	14,695	-----	-----	-----	-----	5,525	5,525	20,220	20,220
Imperial.....	27,855	40,389	-----	-----	-----	-----	14,566	23,306	63,695	63,695
Kern.....	23,500	19,000	-----	-----	*	*	-----	-----	23,500	19,000
Lassen.....	19,600	13,700	-----	-----	-----	-----	-----	-----	19,600	13,700
Los Angeles.....	32,276	59,355	24,415	\$55,171	628,452	342,714	b, c 11,779,216	6,299,455	12,491,438	6,729,616
Mariposa.....	30,060	50,000	44,246	84,884	-----	-----	-----	-----	74,246	134,884
Modoc.....	16,245	19,876	-----	-----	-----	-----	-----	-----	16,245	19,876
Mono.....	48,400	16,133	215	1,605	11,225	3,500	-----	-----	48,615	17,738
Nevada.....	21,964	30,537	-----	-----	-----	-----	2,270	1,150	35,459	35,187
Placer.....	34,450	29,285	16,740	11,069	-----	-----	-----	-----	51,190	40,354
Riverside.....	52,172	50,397	118,928	136,483	-----	-----	-----	-----	171,100	186,880
Sacramento.....	91,477	96,937	745	574	-----	-----	213,344	156,318	305,566	253,829
San Benito.....	*	*	331	977	-----	-----	2,000	1,000	2,331	1,977
San Bernardino.....	40,600	40,600	*	*	15,325	16,455	43,339	35,941	99,264	92,996
San Luis Obispo.....	34,600	11,500	-----	-----	-----	-----	-----	-----	34,600	11,500
San Mateo.....	40,606	32,540	950	906	58,451	58,659	-----	-----	100,007	92,105
Santa Barbara.....	-----	-----	-----	-----	32,334	31,815	-----	-----	32,334	31,815
Santa Clara.....	*	*	-----	-----	*	*	111,744	116,633	111,744	116,633
Santa Cruz.....	-----	-----	-----	-----	-----	-----	25,606	24,255	125,606	24,255
Shasta.....	b, d 125,619	78,791	-----	-----	300	500	-----	-----	25,919	79,291
Sierra.....	170	384	43	215	-----	-----	-----	-----	213	599
Siskiyou.....	e 151,128	59,962	-----	-----	10,820	16,085	-----	-----	161,948	67,047
Sonoma.....	15,414	7,778	819	847	-----	-----	33,186	19,436	49,419	28,061
Tehama.....	83,289	59,302	-----	-----	-----	-----	-----	-----	83,289	59,302
Tulare.....	58,673	73,413	-----	-----	-----	-----	29,779	23,915	88,452	97,328
Tuolumne.....	59,507	59,353	-----	-----	3,000	6,000	-----	-----	62,507	65,353
Yolo.....	30,400	22,195	-----	-----	-----	-----	-----	-----	30,400	22,195
Amador, Contra Costa, Inyo, Marin, San Benito, Santa Clara, Stanislaus, and Ventura*.....	1,023,892	696,331	-----	-----	-----	-----	-----	-----	1,023,892	696,331
Contra Costa, El Dorado, Lake, Madera, Marin, Napa, San Bernardino, San Diego*.....	-----	-----	404,507	375,539	-----	-----	-----	-----	404,507	375,539
Contra Costa, Butte, El Dorado, Fresno, Kern, Marin, Napa, Orange, San Diego, Santa Clara, Santa Cruz, Stanislaus, and Ventura*.....	-----	-----	-----	-----	388,668	404,590	-----	-----	388,668	404,590
Contra Costa, El Dorado, Fresno, Kern, Madera, Marin, Monterey, Napa, Orange, San Diego, San Francisco, San Joaquin, Solano, and Stanislaus*.....	-----	-----	-----	-----	-----	-----	382,165	315,126	382,165	315,126
Totals.....	2,337,825	\$1,728,939	611,939	\$668,270	1,235,892	\$963,153	12,900,311	\$7,213,163	17,085,967	\$10,573,525

\* Combined to conceal output of a single operator in each.

a Includes granules for roofing and terrazzo.

b Includes decomposed granite.

c Includes a quantity of material quarried prior to 1936 but not reported until then.

d Includes slag.

e Includes volcanic cinder.



## Miscellaneous Stone Production of California, by Years.

The amount and value, annually, of crushed rock (including macadam, ballast, rubble, riprap, and that for concrete), and sand and gravel, since 1893, follow:

## Crushed Rock, Sand and Gravel, by Years

Year	Tons	Value	Year	Tons	Value
1893	371,100	\$456,075	1916	9,951,089	\$4,009,590
1894	661,900	664,838	1917	8,069,271	3,505,662
1895	1,254,688	1,095,939	1918	6,641,144	3,325,889
1896	960,619	839,884	1919	6,919,183	3,678,322
1897	821,123	600,112	1920	9,792,122	6,782,414
1898	1,177,365	814,477	1921	10,914,145	7,834,940
1899	964,898	786,892	1922	13,049,644	10,366,231
1900	789,287	561,642	1923	19,840,301	15,379,838
1901	530,396	641,037	1924	21,451,129	15,962,476
1902	2,056,015	1,249,529	1925	23,819,137	17,407,113
1903	2,215,625	1,673,591	1926	24,987,606	19,859,261
1904	2,296,898	1,641,877	1927	25,126,691	18,912,994
1905	2,621,257	1,716,770	1928	27,471,794	17,328,044
1906	1,555,372	1,418,406	1929	27,104,618	17,840,159
1907	2,288,838	1,915,015	1930	23,514,168	16,430,027
1908	3,999,945	3,241,774	1931	15,848,313	11,848,531
1909	5,531,561	2,708,326	1932	11,361,564	7,183,643
1910	6,827,828	2,777,690	1933	11,181,156	6,871,581
1911	6,487,223	3,610,357	1934	16,148,275	7,131,330
1912	8,044,937	4,532,598	1935	9,041,876	5,571,041
1913	9,817,616	4,823,056	1936	28,528,079	16,578,238
1914	9,288,397	3,960,973			
1915	10,879,497	4,609,278	Totals	411,205,745	\$280,147,160

A comparison of the above table of annual production of these materials with the similar table for cement (see *ante*) reveals the fact that the important growth of the crushed rock and gravel business was coincident with the rapid development of the cement industry from the year 1902.

## INDUSTRIAL MATERIALS

*Bibliography:* State Mineralogist Reports XII-XXXII (inc.). Bulletin 38. Min. & Sci. Press, Vol. 114, March 10, 1917. Spurr and Wormser, "Marketing of Metals and Minerals." "Non-Metallie Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

The following mineral substances have been arbitrarily arranged under the general heading of 'Industrial Materials,' as distinguished from those which have a clearly defined classification, such as metals, salines, structural materials, etc.

These materials, many of which are mineral earths, are, with four or five exceptions, as yet produced on a comparatively small scale. The possibilities of development along several of these lines are large, and with increasing transportation and other facilities, together with steadily growing demands, the future for this branch of the mineral industry in California is promising. There is scarcely a county in the State but might contribute to the output.

Up to within the last few years, at least, production has been in the majority of instances dependent upon more or less of a strictly local market, and the annual tables show the results of such a condition, not only in the widely varying amounts of a certain material produced from year to year, but in widely varying prices of the same material.

The more important of these minerals thus far exploited, so far as shown by value of the output, are barytes, bentonite (fuller's earth), pottery clay, diatomite, dolomite, gypsum, limestone, mineral water, pumice and volcanic ash, pyrite, silica, and soapstone and talc.

This group, as a whole, showed an increase in total value from \$4,618,585 in 1935 to \$5,236,534 in 1936.

The following table gives the comparative figures for the amounts and value of industrial minerals produced in California during the years 1935 and 1936.

Substance	1935		1936		Increase + Decrease— Value
	Amount	Value	Amount	Value	
Barite.....	22,979 tons	\$133,810	*	*	*
Bentonite.....	10,204 tons	68,372	10,185 tons	\$165,131	96,759+
Clay (pottery).....	240,014 tons	377,969	382,823 tons	646,920	268,951+
Feldspar.....	*	*	3,430 tons	24,959	* +
Gems.....		945		2,878	1,933+
Gypsum.....	70,833 tons	151,807	143,549 tons	282,703	130,896+
Limestone.....	227,214 tons	496,054	295,792 tons	661,757	165,703+
Mineral water.....	16,659,254 gals.	940,333	19,348,513 gals.	777,899	162,434—
Pumice and volcanic ash.....	14,890 tons	87,055	17,132 tons	143,709	56,654+
Silica (glass, sand, quartz).....	70,835 tons	297,272	77,830 tons	310,278	13,006+
Talc and soapstone.....	17,332 tons	170,830	25,643 tons	309,287	138,457+
Unapportioned.....		\$1,894,138		\$1,911,013	16,875+
Total values.....		\$4,618,585		\$5,236,534	
Net increase.....					\$617,941+

\* Included under 'Unapportioned.'

<sup>a</sup> Includes carbon dioxide, diatomite, dolomite, feldspar, graphite, mica, mineral paint, pyrite, sillimanite-andalusite-kyanite group, sulphur.

<sup>b</sup> Includes barite, carbon dioxide, diatomite, dolomite, mica, mineral paint, pyrite, sillimanite-andalusite-kyanite group, sulphur.

## ASBESTOS

*Bibliography:* State Mineralogist Reports XII-XIX (inc.), XXII, XXVII (inc.), XXIX, XXXI-XXXII. Bulletins 38, 91. Canadian Dept. of M., Mines Branch Bulletin 69. Min. and Sci. Press, April 10, 1920, pp. 531-533. Eng. & Min. Jour.-Press, Vol. 113, pp. 617-625, 670-677. Asbestology, Vol. 5, No. 7, July, 1927.

During 1936 there was no asbestos reported produced in California. In 1934 there was a small output of this material coming from a property in Napa County, and was used in roofing and plaster. The 1934 annual figures are combined under the 'Unapportioned' item to conceal the output of a single operator.

## Asbestos Production of California, by Years.

Total amount and value of asbestos production in California since 1887, as given in the records of this Bureau, are as follows:

Year	Tons	Value	Year	Tons	Value
1887.....	30	\$1,800	1912.....	90	\$2,700
1888.....	30	1,800	1913.....	47	1,175
1889.....	30	1,800	1914.....	51	1,530
1890.....	71	4,260	1915.....	143	2,860
1891.....	66	3,960	1916.....	145	2,380
1892.....	30	1,830	1917.....	136	10,225
1893.....	50	2,500	1918.....	229	9,903
1894.....	50	2,250	1919.....		
1895.....	25	1,000	1920.....	131	6,240
1896.....			1921.....	410	19,275
1897.....			1922.....	50	1,800
1898.....	10	200	1923.....	20	200
1899.....	30	750	1924.....	70	4,750
1900.....	50	1,250	1925.....		
1901.....	110	4,400	1926.....	25	1,650
1902.....			1927.....		
1903.....			1928.....	13	1,160
1904.....	10	162	1929.....		
1905.....	112	2,625	1930.....	219	6,175
1906.....	70	3,500	1931.....		
1907.....	70	3,500	1932.....		
1908.....	70	6,100	1933.....	309	3,274
1909.....	65	6,500	1934.....		
1910.....	200	20,000	1935.....		
1911.....	125	500	1936.....		
			Totals.....	3,392	\$145,984

\* Annual details concealed under 'Unapportioned.'

## BARITE

*Bibliography:* State Mineralogist Reports XII, XIV, XV, XVII, XXI-XXVII (inc.). Bulletins 38, 87. Eng. & Min. Jour.-Press, Vol. 114, p. 109, July 15, 1922; Vol. 115, pp. 319-324, Feb. 17, 1923. U. S. Bureau of Mines, Inform. Circ. 6221, 6223.

During 1936 the barite produced in California came from a single property each in Mariposa and Plumas counties, the annual details being concealed in the 'Unapportioned' item so as not to reveal the output of either operator. This material was consumed in the manufacture of lithopone, in heavy-gravity oil-well drilling-mud, fillers, and barium chemicals.

In 1935 there was a commercial production of barite in California amounting to a total of 22,979 short tons valued at \$133,810,



f.o.b. railroad-shipping point, as compared with the 1934 output of 21,769 tons worth \$125,514.

The Tariff Act of 1930 placed a duty on foreign imported barite ore, crude or unmanufactured, of \$4 per ton; ground or otherwise manufactured, of \$7.50 per ton.

Present quotations for barite (93% BaSO<sub>4</sub>) vary from \$6 to \$7 (Calif. \$7) per ton, crude, f.o.b. rail-shipping point. Most barite has to be washed and acid treated to remove iron stains or other impurities before being suitable for paint use.

Known occurrences of this mineral in California are located in Inyo, Los Angeles, Mariposa, Monterey, Nevada, San Bernardino, Shasta, Santa Barbara and Tulare counties. The deposit at El Portal, in Mariposa County, have given the largest commercial production to date, in part witherite (barium carbonate, BaCO<sub>3</sub>). Witherite has also been found in Shasta County, but no shipments have yet been made from the deposit.

#### Total Barite Production of California.

The first recorded production of barite in California, according to the statistical reports of the State Mining Bureau, was in 1910. The annual figures are as follows:

Year	Tons	Value	Year	Tons	Value
1910.....	860	\$5,640	1924.....		
1911.....	309	2,207	1925.....		
1912.....	564	2,812	1926.....	4,978	\$38,165
1913.....	1,600	3,680	1927.....	17,993	90,617
1914.....	2,000	3,000	1928.....	13,406	55,888
1915.....	410	620	1929.....	26,796	168,829
1916.....	1,606	5,516	1930.....	19,783	133,107
1917.....	4,420	25,633	1931.....	27,832	156,647
1918.....	100	1,500	1932.....	8,507	49,409
1919.....	1,501	18,065	1933.....	8,405	49,595
1920.....	3,029	20,795	1934.....	21,769	125,514
1921.....	901	4,809	1935.....	22,979	133,810
1922.....	3,370	18,925	1936.....	*	*
1923.....	2,925	16,058	Totals.....	196,043	\$1,130,851

\* Annual details concealed under 'Unapportioned'.

#### BENTONITE (Fuller's Earth)

*Bibliography:* State Mineralogist Reports XIV, XVII, XVIII, XXI, XXIII, XXV-XXVI (inc.). Bulletins 38, 91. U. S. Bureau of Mines, Bulletin 71. Eng. & Min. Jour.-Press, Vol. 121, pp. 837-842, May 22, 1926.

During 1936 there was produced and shipped in California, 10,185 short tons of bentonite (fuller's earth) valued at \$165,131, coming from seven properties—four in San Bernardino and one each in Inyo, Kern, and San Benito counties. The 1936 output, as compared with that of 1935, showed a increase in amount with a decrease in value, which was 10,204 tons, worth \$68,372.

Previous to 1931 the Division of Mines classed this material under the heading of 'fuller's earth,' but it was thought advisable to change the name to bentonite, owing to the fact that much bentonite is

employed in uses that can not be classed as fuller's earth and therefore had been classified in these reports under pottery clay. This was somewhat confusing. Bentonite is the name commonly applied to the clays of the montmorillonite and halloysite group ('rock soap').

Fuller's earth includes many kinds of unctuous clays. It is usually soft, friable, earthy, nonplastic, white and gray to dark green in color, and some varieties disintegrate in water. Production has come mainly from Calaveras and Solano counties, with other deposits noted also in Riverside, Fresno, Inyo and Kern counties.

The Tariff Act of June 21, 1930, placed a duty of \$1.50 a ton on foreign produced imported fuller's earth.

#### Bentonite Production of California by Years.

Bentonite including a small amount of fuller's earth was first produced commercially in this State in 1899, and the total amount and value of the output since that time are as follows:

Year	Tons	Value	Year	Tons	Value
1899.....	620	\$12,400	1919.....	385	\$3,810
1900.....	500	3,750	1920.....	600	6,000
1901.....	1,000	19,500	1921.....	1,185	8,295
1902.....	987	19,246	1922.....	6,606	48,756
1903.....	250	4,750	1923.....	3,650	55,125
1904.....	500	9,500	1924.....	5,290	67,295
1905.....	1,344	38,000	1925.....	5,280	91,842
1906.....	440	10,500	1926.....	23,552	250,192
1907.....	100	1,000	1927.....	13,018	154,764
1908.....	50	1,000	1928.....	53,323	501,743
1909.....	459	7,385	1929.....	15,541	170,563
1910.....	340	3,820	1930.....	12,522	177,964
1911.....	466	5,294	1931.....	13,960	222,583
1912.....	876	6,500	1932.....	4,295	57,670
1913.....	460	3,700	1933.....	4,605	60,621
1914.....	760	5,928	1934.....	6,168	69,325
1915.....	692	4,002	1935.....	10,204	68,372
1916.....	110	550	1936.....	10,185	165,131
1917.....	220	2,180			
1918.....	37	333	Totals.....	183,588	\$1,675,300

#### CARBON DIOXIDE GAS

##### *Bibliography:* State Mineralogist Report XII.

Carbon dioxide gas was first produced commercially in California in 1894. This material came from a drift on the 575 level of the Santa Isabel shaft of the New Almaden Quicksilver mine at Almaden, Santa Clara County. The drift was bulkheaded and a pipe was placed through the bulkhead for the gas to be drawn off, it then being compressed into cylinders and used in the manufacture of soda water.

In 1933 carbon dioxide gas was again produced, this time from wells drilled near Niland, Imperial County. On November 1, 1934, a dry-ice plant was put into operation for condensation of the carbon dioxide produced from the above wells. The 1936 figures are combined under the 'Unapportioned' item to conceal the output of a single producer.

## Carbon Dioxide Gas Production in California, by Years

Year	M cu. ft.	Value
1894 -----	80	\$4,072
1895 -----	800	12,000
1896 -----	81	1,300
1897 -----	---	-----
1933] -----		
1934}* -----	15,440	1,822
1935] -----		
1936 -----	*	*
Totals -----	16,401	\$19,194

\*Annual details concealed under 'Unapportioned.'

## CLAY (Pottery)

*Bibliography:* State Mineralogist Reports I, IV, IX, XII-XV, XVIII-XXVIII (inc.), XXX-XXXII (inc.). Bulletins 38, 99. Preliminary Report No. 7. U. S. Bureau of Standards, Tech. Paper No. 262.

At one time or another in the history of the State, pottery clay has been mined in thirty-four of its counties. Of these 19 contributed in 1936. In this report, 'pottery clay' refers to all clays used in the manufacture of red and brown earthenware, china and sanitary ware, flower pots, floor, faience and ornamental tiling, architectural terra cotta, sewer pipe, drain and roof tile, etc., and the figures for amount and value are relative to the crude material at the pit, without reference to whether the clay was sold in the crude form or was immediately used in the manufacture of any of the above finished products by the producer. It does not include clay used in making brick and hollow building blocks.

There are many other important uses for clay besides pottery manufacture. Among these may be enumerated paper, cotton goods, and chemicals. Clays of the montmorillonite and halloysite group ('rock soap') are being utilized successfully in the manufacture of soaps and for filtering oils and as oil-well drilling mud, also as an earth filler in irrigating ditches which run through porous ground.

During 1936 there was a total of 49 properties in 19 counties which reported an output of 382,823 short tons of pottery clay valued at \$646,920 f.o.b. rail-shipping point for the crude material, as compared with 50 properties in 17 counties producing 240,014 tons, worth \$377,919 in 1935.

Because of the fact that a given product often requires a mixture of several different clays, and that these are not all found in the same pit, it is necessary for most clay-working plants to buy some part of their raw materials from other localities. For these reasons, in compiling the clay industry figures much care is required to avoid duplications. So far as we have been able to segregate the figures, from the data sent in by the operatives, we have credited the clay output to the counties from which the raw material originated; and have deducted tonnages used in brick manufacture, as bricks are classified separately, herein.

A tabulation of the direct returns from the producers, by counties, for the year 1936 is shown herewith:



## POTTERY CLAY IN 1936

<i>County</i>	<i>Tons</i>	<i>Value</i>	<i>Used in the manufacture of</i>
Alameda -----	6,612	\$6,443	Roofing, floor, and mantel tile; chimney, drain, and sewer pipe.
Amador <sup>a</sup> -----	52,813	91,228	Architectural terra cotta; fire-clay and refractories; chimney; drain and sewer pipe; floor, mantel, and roofing tile; art pottery; electrical porcelain; and various.
Contra Costa -----	14,245	15,931	Drain tile, roofing tile, specialties, flower pots, and various.
Los Angeles -----	34,207	23,318	Red earthenware; chimney, drain, and sewer pipe; vents; floor, mantel, and roofing tile; art pottery; and various.
Orange -----	20,519	62,364	Architectural terra cotta; conduits and segment blocks; electrical, porcelain, and chinaware; refractories; vents; drain, floor, and mantel tile; art pottery; and various.
Placer -----	72,817	103,457	Architectural terra cotta; chimney, drain and sewer pipe; faience; floor, mantel, and roofing tile; red earthenware; electrical porcelain; sanitary ware; and various.
Riverside -----	66,150	105,975	Conduit, sewer, and drain pipe; red earthenware; faience, floor, mantel, and roofing tile; and various.
San Bernardino <sup>a</sup> -----	9,781	49,291	Roofing, floor and mantel tile; drain and sewer pipe; red earthenware; refractories; fire-sand; and various.
Santa Clara -----	1,714	2,590	Sewer pipe; art pottery; drain, floor, mantel, and roofing tile; stoneware; and various.
Calaveras, Fresno, <sup>b</sup> Humboldt, Kern, <sup>b</sup> San Diego, San Luis Obispo, <sup>b</sup> Sonoma, Stanislaus, Sutter, Ventura * -----	103,965	186,323	Drain, roofing, and mantel tile; saggers; electrical porcelain; refractories; red earthenware, garden furniture; oil-well drilling-mud; sewer, drain, and conduit pipe; and various.
Totals -----	382,823	\$646,920	

<sup>a</sup> Includes firesand.<sup>b</sup> Includes clay and shale used for oil-well drilling-mud.

\* Combined to conceal the output of single operators in each.

## POTTERY CLAY PRODUCTS

The value of the various pottery clay products made in California during 1936 totaled \$9,886,209, compared with \$6,688,117 in 1935. The distribution for 1936 is shown in the following tabulation:

<i>Product</i>	<i>Number of Producers</i>	<i>Tons</i>	<i>Value</i>
Architectural terra cotta-----	3	3,769	\$363,095
Chimney pipe and flue lining-----	7	6,204	235,964
Drain pipe -----	16	5,655	97,682
Roofing tile -----	18	55,205	705,030
Floor, faience, mantel, and hand made tile -----	23	-----	2,142,374
Sewer pipe -----	9	67,022	1,555,271
Red earthenware -----	6	-----	143,383
Stoneware and chemical stoneware-----	5	-----	464,971
Electrical porcelain -----	4	-----	216,101
Conduit pipe -----	4	4,293	109,326
Fire clay and high temperature cement-----	9	4,904	91,880
Art pottery and chinaware-----	9	-----	1,758,197
Garden furniture -----	3	-----	24,620
Sanitary ware and plumbing fixtures-----	4	-----	1,801,721
Miscellaneous: chimney accessories, gas-stove radiants, porcelain shapes, gas-house tank-blocks, grog, molding clay, segment blocks and liners, vents, glass tank blocks and liners, light aggregate, glazed kitchenware, quarries, swimming-pool gutters, fire clay shapes, and specialties-----	15	-----	176,594
Total value -----			\$9,886,209

All the above clay products in 1936 showed an increased total value with the exception of architectural terra cotta and red earthenware over that of the previous year.

**Pottery Clay Production of California, by Years.**

Amount and value of crude pottery clay output in California since 1887 are given in the following table:

Year	Tons	Value	Year	Tons	Value
1887.....	75,000	\$37,500	1913.....	231,179	\$261,273
1888.....	75,000	37,500	1914.....	179,948	167,552
1889.....	75,000	37,500	1915.....	157,866	133,724
1890.....	100,000	50,000	1916.....	134,636	146,538
1891.....	100,000	50,000	1917.....	166,298	154,602
1892.....	100,000	50,000	1918.....	112,423	166,788
1893.....	24,856	67,284	1919.....	135,708	245,019
1894.....	28,475	35,073	1920.....	203,997	440,689
1895.....	37,660	39,685	1921.....	225,120	362,172
1896.....	41,907	62,900	1922.....	277,232	473,184
1897.....	21,592	30,290	1923.....	376,863	697,841
1898.....	28,947	33,747	1924.....	417,928	651,857
1899.....	40,600	42,700	1925.....	537,587	674,376
1900.....	59,636	60,956	1926.....	801,461	806,509
1901.....	55,679	39,144	1927.....	867,419	872,661
1902.....	67,933	74,163	1928.....	887,807	1,394,950
1903.....	90,972	99,907	1929.....	839,949	1,127,527
1904.....	84,149	81,952	1930.....	938,586	795,517
1905.....	133,805	130,146	1931.....	332,680	408,931
1906.....	167,267	162,283	1932.....	167,284	204,890
1907.....	160,385	254,454	1933.....	141,629	211,711
1908.....	208,042	325,147	1934.....	190,510	245,900
1909.....	299,424	465,647	1935.....	240,014	377,969
1910.....	249,028	324,099	1936.....	382,823	646,920
1911.....	224,576	252,759			
1912.....	199,605	215,683	Totals.....	11,699,485	\$14,729,619

**DIATOMITE (Diatomaceous Earth)**

*Bibliography:* State Mineralogist Reports II, XII-XV (inc.), XVII-XXVIII (inc.), XXXI, XXXII. Bulletins 38, 67, 91. Am. Inst. Min. Eng., Bull. 104, Aug. 1915, pp.1539-1550. U. S. Bur. of Mines, Rep. of Investigations: Serial No. 2341, Jan. 1923. Eng. & Min. Jour.-Press, Vol. 115, pp. 1152-1154, June 30, 1923.

Diatomite, also known as diatomaceous earth, infusorial earth, tripolite and kieselguhr, is very light (when dry a cubic foot weighs 18 to 20 pounds) and extremely porous, chalk-like material composed of pure silica (chalk, being calcareous) which has been laid down under water and consists of the remains of microscopical infusoria and diatoms. The former are animal remains, and the latter are from plants.

The most important deposits in California thus far known are located in Monterey, Orange, San Luis Obispo, and Santa Barbara counties. The Santa Barbara material is diatomaceous and is of a superior quality, particularly for filtration uses which bring the higher prices. Infusorial or diatomaceous earths are also found in Fresno, Kern, Los Angeles, Plumas, San Benito, San Bernardino, San Joaquin, Shasta, Sonoma and Tehama counties.

As about 70 per cent of the California output is from a single operator, we have concealed the exact figures under the 'Unapportioned' item in the State and county totals. There were six operators during 1936 in Fresno, Los Angeles, Monterey, Santa Barbara, and Stanislaus counties. The shipments during the year showed a slight decrease in total tonnage and value compared with 1935.

The material shipped was utilized for insulation of both heat and sound, filtration, paint, pigment, cement admixture, fillers, abrasives and for clarification of gasoline and kerosene.



Milling Plant of Johns-Manville Corp. at Lompoc, Santa Barbara Co.  
Photo by Henry Mulryan.

#### Total Production of Diatomite in California.

The first recorded production of these materials in California occurred in 1889; total amount and value of output, to date, are as follows:

Year	Tons	Value	Year	Tons	Value
1889.....	39	\$1,335	1914.....	12,840	\$80,350
1890.....			1915.....	12,400	62,000
1891.....			1916.....	15,322	80,649
1892.....			1917.....	24,301	127,510
1893.....	50	2,000	1918.....	35,963	189,459
1894.....	51	2,040	1919.....	40,200	217,800
1895.....			1920.....	60,764	1,056,260
1896.....			1921.....	*90,739	1,016,675
1897.....	5	200	1922.....		
1898.....			1923.....		
1899.....			1924.....	*193,064	5,729,736
1900.....			1925.....		
1901.....			1926.....		
1902.....	422	2,532	1927.....	*275,403	1,995,923
1903.....	2,703	16,015	1928.....		
1904.....	6,950	112,282	1929.....		
1905.....	3,000	15,000	1930.....	*300,017	4,848,661
1906.....	2,430	14,400	1931.....		
1907.....	2,531	28,948	1932.....		
1908.....	2,950	32,012	1933.....	*203,228	3,104,154
1909.....	500	3,500	1934.....		
1910.....	1,843	17,617	1935.....	*	*
1911.....	2,194	19,670	1936.....	*	*
1912.....	4,129	17,074			
1913.....	8,645	35,968	Totals.....	1,302,683	\$18,827,770

\* Annual details concealed under 'Unapportioned.'



## DOLOMITE

*Bibliography:* State Mineralogist Reports XV, XVII, XXVII, XXVIII, XXXI.

The 1936 production came from two properties, one each in Inyo and Monterey counties, the annual details are placed under the 'Unapportioned' item to conceal the output of each operator. The 1936 output showed a decrease from that of 1935. The material shipped was utilized for steel-furnace flux and refractories, plaster, stucco, dash-coat, terrazzo, art stone, and for manufacture of CO<sub>2</sub>.

## Dolomite Production of California, by Years.

Previous to the 1915 statistical report of the State Mining Bureau, dolomite was included under limestone, as the two minerals are closely related chemically; but since dolomite, as such, has been found to have certain distinctive applications, we here give it a separate classification.

Amount and value of the output of dolomite, annually, have been as follows:

Year	Tons	Value
1915.....	4,192	\$14,504
1916.....	13,313	46,566
1917.....	27,911	66,416
1918.....	24,560	79,441
1919.....	24,502	67,953
1920.....	42,388	132,791
1921.....	31,195	99,155
1922.....	52,409	114,911
1923.....	69,519	142,615
1924.....	28,843	71,271
1925.....	42,852	104,900
1926.....	68,640	119,313
1927.....	45,976	79,442
1928.....	38,379	85,342
1929.....	58,644	156,928
1930}.....	66,564	161,245
1931}*.....		
1932.....	35,275	40,956
1933.....	54,456	176,575
1934}.....	108,645	304,984
1935}*.....		
1936.....	*	*
Totals.....	938,263	\$2,065,308

\* Annual details concealed under 'Unapportioned.'

## FELDSPAR

*Bibliography:* State Mineralogist Reports XV, XVII-XXVIII (inc.), XXX, XXXI. Bulletins 67, 91. U. S. Bureau of Mines, Bulletin 92. Eng. & Min. Jour.-Press, Vol. 115, pp. 535-538, Mar. 24, 1923.

The output of feldspar in California during 1936 amounted to 3,430 short tons valued at \$24,959, and came from three properties in San Diego County, and one in Fresno County. The 1936 production was an increase in quantity and value as compared with that of 1935 which was 3,265 tons worth \$21,855.

Total Feldspar Production in California.

Total amount and value of feldspar production in California since the inception of the industry are given in the following table, by years:

Year	Tons	Value	Year	Tons	Value
1910.....	760	\$5,720	1925.....	8,165	\$59,615
1911.....	740	4,560	1926.....	7,300	56,400
1912.....	1,382	6,180	1927.....	10,932	86,101
1913.....	2,129	7,850	1928.....	14,628	93,745
1914.....	3,530	16,565	1929.....	13,327	78,404
1915.....	1,800	9,000	1930.....	5,014	35,654
1916.....	2,630	14,350	1931.....	4,795	59,921
1917.....	11,792	46,411	1932.....	2,294	15,988
1918.....	4,132	22,061	1933}*.....	2,655	30,611
1919.....	1,272	12,965	1934}*.....		
1920.....	4,518	26,189	1935.....	3,265	21,855
1921.....	4,349	28,343	1936.....	3,430	24,959
1922.....	4,587	37,109			
1923.....	11,100	81,800	Totals.....	140,581	\$950,463
1924.....	9,055	68,112			

\* Annual details concealed under 'Unapportioned.'

FLUORSPAR

*Bibliography:* State Mineralogist Reports XVII, XVIII, XXIV, XXVI. Bulletins 67, 91. Eng. & Min. Jour.-Press, Vol. 177, pp. 489-492, Mar. 22, 1924.

There were no shipments of fluorspar reported in California during 1936. The 1934 output came from San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of a single operator. This material was shipped to steel mills to be used as a flux. The combined production of 1933 and 1934 amounted to a total of 227 tons worth \$3,631.

Fluorspar, or calcium fluoride, CaF<sub>2</sub>, is one of the most important nonmetallic minerals from an industrial standpoint. About 80 per cent of the commercial mineral is prepared in the 'gravel' form and utilized as a flux in the manufacture of steel, for which use no substitute has yet been found.

In California deposits have been reported in Los Angeles, Mono, Riverside and San Bernardino counties. A previous commercial production was made in 1917-1918, when a total of 79 tons valued at \$991 was shipped from Riverside County.

Present quotations (Metal and Mineral Markets) are: not less than 85 per cent CaF<sub>2</sub> and not over 5 per cent SiO<sub>2</sub>, \$20 per ton; No. 2 lamp, \$21 per ton.

GEMS

*Bibliography:* State Mineralogist Reports II, XIV, XV, XVII, XVIII, XX, XXI-XXVIII (inc.), XXX, XXXII (inc.). Bulletins 37, 67, 91. U. S. G. S., 'Mineral Resources of the U. S.'; Bull. 603, p. 208. Bull. Dept. Geo. Univ. of Cal., Vol. 5, pp. 149-153, 331-380. Am. Jour. Sci., Vol. 31, p. 31.

The production of gem materials in California has been somewhat irregular and uncertain since 1911. The compilation of complete statistics is difficult owing to widely-scattered places at which stones are gathered and marketed, for the most part in a small way. The

gem material reported in California during 1936 had a total value of \$2,878. This output came from Butte, Marin, Monterey, Riverside, San Bernardino, San Diego, and Santa Clara counties; and consisted of diamonds, jasper, iceland spar, garnet, topaz, iridescent obsidian, and opal. The above showed an increase as compared with that of 1935 which was worth \$945.

#### Total Production of Gem Materials in California.

The value of the gem output in California annually since the beginning of commercial production is as follows:

Year	Value	Year	Value
1900.....	\$20,500	1920.....	\$36,056
1901.....	40,000	1921.....	10,954
1902.....	162,100	1922.....	1,312
1903.....	110,500	1923.....	13,220
1904.....	136,000	1924.....	4,800
1905.....	148,500	1925.....	10,663
1906.....	497,090	1926.....	9,049
1907.....	232,642	1927.....	7,035
1908.....	208,950	1928.....	22,200
1909.....	193,700	1929.....	26,850
1910.....	237,475	1930.....	3,540
1911.....	51,824	1931.....	5,607
1912.....	23,050	1932.....	4,961
1913.....	13,740	1933.....	690
1914.....	3,970	1934.....	2,456
1915.....	3,565	1935.....	945
1916.....	4,752	1936.....	2,878
1917.....	3,049		
1918.....	650	Total.....	\$2,260,698
1919.....	5,425		

#### GRAPHITE

*Bibliography:* State Mineralogist Reports XIII, XIV, XV, XVII, XXVI (inc.), XXX. Bulletins 67, 91. U. S. G. S., Min. Res., 1914, Pt. II.

Graphite (also called plumbago) has been produced from time to time in the State, coming principally from Sonoma and Los Angeles counties.

Occurrences of graphite have been reported at various times from Calaveras, Fresno, Imperial, Inyo, Los Angeles, Mendocino, San Bernardino, San Diego, Siskiyou, Sonoma and Tuolumne counties. From 1931 to 1933 there was a small production of graphite from a property in Los Angeles County. The annual details are concealed under 'Unapportioned,' owing to their having been but a single operator.

During 1936 no production of graphite was reported in California. In 1935 there was a small output of graphite coming from a single property in Los Angeles County. This material was used for experimental purposes. The annual details are concealed under the 'Unapportioned' item to conceal the output of the operator.

#### Graphite Production of California, by Years.

According to the records of the State Mining Bureau, the graphite production of California, by years, has been as follows:



Year	Pounds	Value
1901	128,000	\$4,480
1902	84,000	1,680
1903		
1913	2,500	25
1914		
1915		
1916	29,190	2,335
1917		
1918	*770,000	37,225
1919		
1920		
1921	*624,000	26,160
1922		
1923		
1925		
1926	*76,000	13,120
1927		
1928		
1931		
1932	156,000	1,950
1933		
1934		
1935		
1936		
Totals	2,269,690	\$86,975

\* Annual details concealed under 'Unapportioned,' on account of a single producer.

### GYPSUM

*Bibliography:* State Mineralogist Reports XIV, XV, XVII, XVIII, XXII, XXIII, XXV-XXVIII (inc.), XXX, XXXI. Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 223, 413, 430, 697. U. S. Bur. of Standards, Circular No. 281.

During 1936 there were shipments of gypsum in California amounting to 143,549 tons valued at \$282,703, coming from three properties in Fresno County, and one each in Imperial, Kern, and Riverside counties. This was an increase in both amount and value over the 1935 output which was 70,833 tons worth \$151,807.

### Total Production of Gypsum in California.

Production of gypsum annually in California since such records have been compiled by this Bureau is as follows:

Year	Tons	Value	Year	Tons	Value
1887	2,700	\$27,000	1913	47,100	\$135,050
1888	2,500	25,000	1914	29,734	78,375
1889	3,000	30,000	1915	20,200	48,953
1890	3,000	30,000	1916	33,384	59,533
1891	2,000	20,000	1917	30,825	56,840
1892	2,000	20,000	1918	19,695	37,176
1893	1,620	14,280	1919	19,813	50,579
1894	2,446	24,584	1920	20,507	92,535
1895	5,158	51,014	1921	37,412	78,875
1896	1,310	12,580	1922	47,084	188,336
1897	2,200	19,250	1923	86,410	289,136
1898	3,100	23,600	1924	25,569	53,210
1899	3,663	14,950	1925	107,613	172,444
1900	2,522	10,088	1926	114,868	211,337
1901	3,875	38,750	1927	94,630	292,090
1902	10,200	53,500	1928	104,790	200,567
1903	6,914	46,441	1929	140,844	396,951
1904	8,350	56,592	1930	116,865	243,507
1905	12,859	54,500	1931	88,354	199,198
1906	21,000	69,000	1932	46,867	93,818
1907	8,900	57,700	1933	59,235	120,451
1908	34,600	155,400	1934	58,149	113,606
1909	30,700	138,176	1935	70,833	151,807
1910	45,294	129,152	1936	143,549	282,703
1911	31,457	101,475			
1912	37,529	117,388	Totals	1,853,216	\$4,987,497

## LIMESTONE

*Bibliography:* State Mineralogist Reports IV, XII-XV (inc.), XVII-XXXI (inc.). Bulletins 38, 91. Oregon Agr. College Extension Bulletin 305. Eng. and Min. Jour.-Press, Vol. 120, pp. 249-253.

'Industrial' limestone was produced by 21 properties in nine counties in California during 1936 to the amount of 295,792 short tons valued at \$661,757, this being an increase in amount and value over the 1935 output, which was 227,214 tons worth \$496,054. The 1936 yield came from four properties each in El Dorado and San Bernardino counties; three each in Santa Clara and Santa Cruz counties; two each in Fresno and Tuolumne counties; and one each in Los Angeles, San Luis Obispo, and San Mateo counties.

The amount here given does not include the limestone used in the manufacture of cement nor for macadam and concrete, nor of lime for building purposes; but accounts for that utilized as a smelter and foundry flux, for glass and sugar making, and other special chemical and manufacturing processes. It also includes that utilized for fertilizers (agricultural 'lime'), 'roofing gravel,' paint and concrete filler, whiting for paint, putty, kalsomine, terrazzo, paving dust, chicken grit, carbon dioxide gas, 'paving compound,' facing dust for concrete pipe, also for rubber and magnesite mix. The material from Fresno County was marl; and that from Alameda, San Mateo and Santa Clara counties was shells, dredged from San Francisco Bay, which were ground and used for agricultural purposes and poultry grit. Of the total 'industrial' limestone produced in 1936 approximately 105,982 tons valued at \$239,263 was used for agricultural purposes and poultry grits.

Distribution of the 1936 output of limestone was as follows:

<i>County</i>	<i>Tons</i>	<i>Value</i>
El Dorado -----	159,134	\$348,055
San Bernardino -----	19,046	52,633
Santa Clara <sup>b</sup> -----	59,038	91,178
Santa Cruz -----	9,805	29,170
Fresno, <sup>a</sup> Los Angeles, San Luis Obispo, San Mateo, <sup>b</sup> and Tuolumne* -----	48,769	132,952
<b>Totals -----</b>	<b>295,792</b>	<b>\$661,757</b>

\* Combined to conceal the output of individual operators in each.

<sup>a</sup> Includes marl.

<sup>b</sup> Includes shells.

#### Limestone Production of California, by Years.

The following tabulation gives the amounts and value of 'industrial' limestone produced in California by years since 1894 when compilation of such records was begun by the State Mining Bureau. These tonnages consist principally of limestone utilized for flux, glass and sugar making, agricultural, chemical, and other special industrial purposes. That utilized in cement manufacture is not included:

Year	Tons	Value	Year	Tons	Value
1894	15,420	\$19,275	1917	237,279	\$356,396
1895	71,355	71,690	1918	208,566	456,258
1896	68,184	71,112	1919	88,291	248,145
1897	36,796	38,556	1920	90,120	298,197
1898	27,686	24,548	1921	75,921	305,912
1899	30,769	29,185	1922	84,382	282,181
1900	32,791	31,532	1923	143,266	348,464
1901	76,937	99,445	1924	219,476	582,660
1902	71,422	90,524	1925	319,977	494,525
1903	125,919	163,988	1926	108,795	367,501
1904	40,207	87,207	1927	699,790	663,957
1905	192,749	323,325	1928	127,895	397,935
1906	80,262	162,827	1929	168,315	557,617
1907	230,985	406,041	1930	169,477	508,751
1908	273,890	297,264	1931	177,268	560,699
1909	337,676	419,921	1932	168,950	487,788
1910	684,635	581,209	1933	207,371	487,712
1911	516,398	452,790	1934	198,057	461,139
1912	613,375	570,248	1935	227,214	496,054
1913	301,918	274,455	1936	295,792	661,757
1914	572,272	517,713			
1915	146,324	156,288	Totals	8,750,693	\$14,119,523
1916	157,521	217,733			

## LITHIA

*Bibliography:* State Mineralogist Reports II, IV, XIV, XXI, XXX. Bulletins 38, 67, 91.

Lithia mica, lepidolite (a silicate of lithium and others), utilized in the manufacture of artificial mineral water, fireworks, glass, etc., has been mined in San Diego County since 1899, except between 1905 and 1915, though there was none shipped in 1923, 1925, 1929-1935 (inc.). During 1930 there was a small amount of lepidolite mined in California, but none shipped. Some amblygonite, a lithium phosphate, is occasionally also obtained from pockets associated with the gem tourmalines.

Lithia mica total production in the State has been as follows:

Year	Tons	Value	Year	Tons	Value
1899	124	\$4,600	1920	10,046	\$153,502
1900	440	11,000	1921	*1,365	20,781
1901	1,100	27,500	1922		
1902	822	31,880	1923		
1903	700	27,300	1924	109	2,269
1904	641	25,000	1925		
1905	25	276	1926		
1906			1927	*550	13,900
1915	91	1,365	1928		
1916	71	1,065	1929		
1917	880	8,800			
1918	4,111	73,998	Totals	21,875	\$417,636
1919	800	14,400			

\* Annual details concealed under 'Unapportioned.'

## MICA

*Bibliography:* State Mineralogist Reports II, IV, XXVI-XXVIII (inc.), XXX. Bulletins 38, 67, 91. U. S. Geol. Surv., Bull. 740; Min. Res. of U. S. Eng. & Min. Jour.-Press, Vol. 115, pp. 55-60, Jan. 13, 1923.

Sericite, a fine-grained variety of muscovite, has been produced continuously since 1929 in California with the exception of 1934. The



1936 output of mica came from a single property each in Imperial, Kern, and Riverside counties, while that for 1935 came from a single property in Imperial County. The annual details are concealed in the 'Unapportioned' item so as not to reveal production of the individual operator. The material from Imperial and Kern counties was sericite, and that from Riverside County was vermiculite. The sericite is used as a cheap grade of ground mica for roofing, as a refractory, foundry facing, and decorative material to imitate snow. Vermiculite, a hydrous mica, is expanded by heating and then used as an insulating agent.

Production of mica in California has been as follows:

Year	Tons	Value
1902 -----	50	\$2,500
1903 -----	50	3,800
1904 -----	50	3,000
1929 } -----		
1930 } • -----	2,240	15,260
1931 } -----		
1932 } -----		
1933 } • -----	1,957	13,963
1934 -----		
1935 } -----	3,833	15,650
1936 } • -----		
Totals -----	8,180	\$54,173

• Annual details concealed under 'Unapportioned.'

#### MINERAL PAINT

*Bibliography:* State Mineralogist Reports XII-XIX (inc.), XXI, XXII-XXVIII (inc.). Bulletins 38, 91.

During 1935 and 1936 there was a small amount of mineral paint produced in California, which came from a single property in Placer County. The details are concealed under 'Unapportioned' so as not to reveal individual output. There was no production in 1934.

These materials have come from Alameda, Amador, Butte, Calaveras, Colusa, Los Angeles, Napa, Nevada, Placer, Riverside, Shasta, Sonoma, Stanislaus and Ventura counties. There are also other deposits that may have possible commercial value, but as yet there have been no commercial shipments from El Dorado, Imperial, Kern, Kings, Lake, Mendocino, San Diego, Siskiyou, Trinity and Yuba counties, in which they are found.

#### Mineral Paint Production of California, by Years.

The first recorded production of mineral paint materials in the State was in the year 1890. The output, showing annual amount and value since that time, is given herewith:

Year	Tons	Value	Year	Tons	Value
1890.....	40	\$480	1914.....	132	\$847
1891.....	22	830	1915.....	311	1,756
1892.....	25	750	1916.....	643	3,960
1893.....	590	26,795	1917.....	520	2,700
1894.....	610	14,140	1918.....	728	4,738
1895.....	750	8,425	1919.....	1,780	17,055
1896.....	395	5,540	1920.....	779	8,477
1897.....	578	8,165	1921.....	446	4,748
1898.....	653	9,698	1922.....	1,620	13,277
1899.....	1,704	20,294	1923.....	1,049	11,773
1900.....	529	3,993	1924.....	532	5,234
1901.....	325	875	1925.....	669	6,969
1902.....	589	1,533	1926.....	569	5,846
1903.....	2,370	3,720	1927.....	919	9,592
1904.....	270	1,955	1928.....	467	2,820
1905.....	754	4,025	1929.....	250	3,000
1906.....	250	1,720	1930.....		
1907.....	250	1,720	1931.....		
1908.....	335	2,250	1932.....		
1909.....	305	2,325	1933.....		
1910.....	200	2,040	1935.....	570	5,550
1911.....	186	1,184	1936.....		
1912.....	300	1,800			
1913.....	303	1,780	Totals.....	23,717	\$227,648

\* Annual details concealed under 'Unapportioned.'

MINERAL WATER

*Bibliography:* State Mineralogist Reports VI, XII-XVIII (inc.), XXI-XXIX (inc.), XXXI, XXXII. U. S. G. S., Water Supply Paper 338. Min. Res., 1914, 1916. 'Mineral Springs and Health Resorts of California,' by Dr. Winslow Anderson, 1890. U. S. Dept. of Agr., Bur. of Chem., Bulletin 91.

A widespread production of mineral water is shown annually in California. These figures refer to mineral water actually bottled for sale, or for local consumption. Water from some of the springs having a special medicinal value brings a price many times higher than the average shown, while in some cases the water is used merely for drinking purposes and sells for a nominal figure. Health and pleasure resorts are located at many of the springs. The waters of some of the hot springs are not suitable for drinking, but are very efficacious for bathing. From a therapeutic standpoint, California is particularly rich in mineral springs.

The commercial production of mineral water during 1936 amounted to 19,348,513 gallons valued at \$777,899, as compared with 16,659,254 gallons worth \$940,333 in 1935. The 1936 output came from springs on 43 properties in 19 counties, and was distributed as follows:

County	Gallons	Value
Lake .....	29,729	\$12,545
Los Angeles .....	9,126,944	435,842
Napa .....	55,950	7,245
Sonoma .....	29,642	6,460
Butte, Calaveras, Colusa, Contra Costa, El Dorado, Marin, Orange, Placer, Riverside, San Bernardino, San Diego, San Francisco, San Luis Obispo, Santa Barbara, Siskiyou * .....	10,106,248	315,807
Totals .....	19,348,513	\$777,899

\* Combined to conceal the output of operators in each.

The production above tabulated either came from springs or artesian wells, and was bottled, in part with artificial carbonation, but mostly natural, and sold for drinking purposes. A large part was used in the preparation of soft drinks with flavors:

## Mineral Water Production of California, by Years.

Mineral water was bottled for sale, at the Napa Soda Springs, Napa County, as early as 1856,<sup>1</sup> and at other springs in California, notably The Geysers, Sonoma County, also at early dates; but there are no figures available earlier than the year 1887. Amounts and values, annually, since that year are shown herewith:

Year	Gallons	Value	Year	Gallons	Value
1887.....	618,162	\$144,368	1913.....	2,350,792	\$599,748
1888.....	1,112,202	252,990	1914.....	2,443,572	476,169
1889.....	808,625	252,241	1915.....	2,274,267	467,738
1890.....	258,722	89,786	1916.....	2,273,817	410,112
1891.....	334,553	139,959	1917.....	1,942,020	340,566
1892.....	331,875	162,019	1918.....	1,808,791	375,650
1893.....	383,179	90,667	1919.....	2,233,842	340,117
1894.....	402,275	184,481	1920.....	2,391,791	421,643
1895.....	701,397	291,500	1921.....	3,446,278	367,476
1896.....	808,843	337,434	1922.....	4,276,346	486,424
1897.....	1,508,192	345,863	1923.....	5,487,276	616,919
1898.....	1,429,809	213,817	1924.....	8,159,211	818,726
1899.....	1,338,537	406,691	1925.....	12,115,072	1,230,455
1900.....	2,456,115	268,607	1926.....	14,074,877	1,171,550
1901.....	1,555,328	559,057	1927.....	16,644,423	1,487,183
1902.....	1,701,142	612,477	1928.....	25,049,002	1,304,969
1903.....	2,056,340	558,201	1929.....	27,032,083	2,040,615
1904.....	2,430,320	496,946	1930.....	37,354,111	2,870,663
1905.....	2,194,150	538,700	1931.....	26,164,331	1,347,860
1906.....	1,585,690	478,186	1932.....	19,031,224	1,495,988
1907.....	2,924,269	544,016	1933.....	15,650,406	719,746
1908.....	2,789,715	560,507	1934.....	19,882,436	1,071,197
1909.....	2,449,834	465,488	1935.....	16,659,254	940,333
1910.....	2,335,259	522,009	1936.....	19,348,513	777,899
1911.....	2,637,669	590,654			
1912.....	2,497,704	529,384	Totals.....	324,743,731	\$31,905,793

## PHOSPHATES

*Bibliography:* State Mineralogist Report XXI. Bulletins 67, 91.

No commercial production of phosphates has been recorded from California, though occasional pockets of the lithium phosphate, amblygonite,  $\text{Li (AlF) PO}_4$ , have been found associated with the gem tourmaline deposits in San Diego County. Such production has been classified under lithia.

## PUMICE and VOLCANIC ASH

*Bibliography:* State Mineralogist Reports XII, XIV, XV, XVII, XVIII, XXII-XXVIII (inc.), XXX-XXXII (inc.). Bulletin 38. U. S. Bureau of Mines I. G. 6560. (See 'Tufa.')

The production of pumice and volcanic ash in California during the year 1936 amounted to 17,132 tons valued at \$143,709, coming from five properties in Siskiyou County, three in Inyo County, two in Napa County; and one each in Imperial, Kern, Mono, Madera, and San Luis Obispo counties. The 1936 output showed an increase in both amount and value over the 1935 figures, which were 14,890 tons worth \$87,055.

The material from two of the deposits in Inyo County and from Imperial, Mono, Napa, and Siskiyou counties was 11,031 tons of pumice; which was used in acoustic plaster, light-weight aggregate in concrete, for abrasive purposes, and for chicken-house litter. The product from

<sup>1</sup> Cronise, T. F., The natural wealth of California, p. 182, 1868.



one property in Inyo and that from Kern, Madera and San Luis Obispo counties was 6,101 tons of volcanic ash or tuff variety and was employed in making soap, cleanser compounds, a large tonnage being utilized as a concrete filler in cement displacement, and in asphalt and as a carrier for dry agricultural sprays. The Kern County ash is going into the preparation of one of our popular and nationally advertised brands of cleanser compounds.

**Pumice Production of California, by Years.**

Commercial production of pumice in California was first reported to the State Mining Bureau in 1909, then not again until 1912, since which year there has been a small annual output, as indicated by the following table:

Year	Tons	Value	Year	Tons	Value
1909.....	50	\$500	1924.....	4,919	\$33,404
1910.....			1925.....	5,319	32,937
1911.....			1926.....	7,170	48,350
1912.....	100	2,500	1927.....	13,779	168,896
1913.....	3,590	4,500	1928.....	10,440	105,055
1914.....	50	1,000	1929.....	10,449	76,123
1915.....	380	6,400	1930.....	12,947	128,847
1916.....	1,246	18,092	1931.....	11,711	108,130
1917.....	525	5,295	1932.....	9,891	86,034
1918.....	2,114	28,669	1933.....	8,243	61,067
1919.....	2,388	43,657	1934.....	9,951	54,748
1920.....	1,537	25,890	1935.....	14,890	87,055
1921.....	406	6,310	1936.....	17,132	143,709
1922.....	613	4,248			
1923.....	2,936	16,309	Totals.....	142,776	\$1,297,725

**PYRITES**

*Bibliography:* State Mineralogist Reports XVIII, XIX, XXII, XXV, XXVI, XXX. Bulletins 38, 91. Min. and Sci. Press, Vol. 144, pp. 825, 840.

Pyrite, shipped in California during 1936 came from a single property in Shasta County. The 1936 production showed a decrease in both quantity and value from that of 1935. The annual details are placed under 'Unapportioned' to conceal the output of the individual operator.

This material was mostly used in the manufacture of sulphuric acid for explosives and fertilizer. Some iron sulphate had been produced previously and was utilized directly in the preparation of an agricultural fertilizer and insecticide. The sulphur content ranged up to 50.8% S.

This does not include the large quantities of pyrite, chalcopyrite, and other sulphides which are otherwise treated for their valuable metal contents. Some sulphuric acid is annually made as a by-product in the course of roasting certain tonnages of Mother Lode auriferous concentrates while under treatment for their precious metal values.

**Pyrites Production in California, by Years.**

The total recorded pyrites production in California to date is as follows:

Year	Tons	Value	Year	Tons	Value
1898.....	6,000	\$30,000	1919.....	147,024	\$540,300
1899.....	5,400	28,620	1920.....	146,001	530,581
1900.....	3,612	21,133	1921.....	110,025	473,735
1901.....	4,578	18,429	1922.....	151,381	570,425
1902.....	17,525	60,306	1923.....	148,004	555,308
1903.....	24,311	94,000	1924.....	124,214	517,835
1904.....	15,043	62,992	1925.....	129,500	528,550
1905.....	15,503	63,958	1926.....	100,896	466,088
1906.....	46,689	145,895	1927.....	130,910	564,823
1907.....	82,270	251,774	1928.....	90,566	400,627
1908.....	107,081	610,335	1929.....	79,169	363,717
1909.....	457,867	1,389,802	1930.....	39,958	194,228
1910.....	42,621	179,862	1931.....	25,402	131,174
1911.....	54,225	182,954	1932}.....	72,271	297,832
1912.....	69,872	203,470	1933}.....		
1913.....	79,000	218,537	1934}.....	157,129	547,754
1914.....	79,267	230,058	1935}.....		
1915.....	92,462	293,148	1936.....	*	*
1916.....	120,525	372,969			
1917.....	111,325	323,704	Totals.....	3,214,985	\$11,889,985
1918.....	128,329	425,012			

\* Annual details concealed under 'Unapportioned.'

## SHALE OIL

*Bibliography:* State Mineralogist Report XIX. U. S. Geol. Surv., Bulletins 322, 729. U. S. Bur. of Mines, Bull. 210. Eng. and Min. Jour.-Press, Vol. 118, No. 8, pp. 290-292, Aug. 23, 1924. Chem. & Met. Eng., Vol. 32, No. 6, Feb., 1925. Min. Congress Jour., Dec., 1924.

Two plants on a more or less experimental scale operated for six years in California, with commercial production beginning in a small way in 1922. The product, in part, was sold for utilization as a flotation oil in metallurgical work, and part consumed as fuel at the plants. There has been no production reported since 1927.

## Shale Oil Production of California, by Years

Year	Barrels	Value
1922}*	4,333	\$44,262
1923}.....		
1924}*	8,688	55,240
1925}.....		
1926}*	8,819	9,998
1927}.....		
1928.....	----	----
Totals .....	21,840	\$109,500

\* Annual details concealed under 'Unapportioned.'

## SILICA (Sand and Quartz)

*Bibliography:* State Mineralogist Reports IX, XIV, XV, XVII, XVIII, XX-XXVIII (inc.), XXXI, XXXII. Bulletins 38, 67, 91.

We combine these materials because of the overlapping roles of vein quartz which is mined for use in glass making and as an abrasive, and that of silica sand which, although mainly utilized in glass manufacture, also serves as an abrasive. Both varieties are also utilized to some extent in fire-brick manufacture.

We do not include under this heading such forms of silica as: quartzite, sandstone, flint, tripoli, diatomaceous earth, nor the gem forms of 'rock crystal,' amethyst, and opal. Each of these has various industrial uses, which are treated under their own designations.

The production of silica in California during 1936 amounted to 77,830 short tons valued at \$310,278 f.o.b. rail shipping point, and came from two properties in Contra Costa County and one each in Fresno, Placer, Riverside, and San Diego counties. The above was an increase in both amount and value over the output of 1935, which was 70,835 tons worth \$297,272. The 1936 output consisted of 76,571 tons of glass sand and 1259 tons of vein or boulder quartz.

The glass sand came from Contra Costa and Riverside counties. For making the higher grades of glass, deposits in Contra Costa County are replacing the sand imported from Belgium. Belgium sand has displaced local material in the manufacture of sodium silicate ('water glass'). There are various deposits of quartz in California which could be utilized for glass making, but to date they have not been so used owing to the cost of grinding and the difficulty of preventing contamination by iron while grinding.

Silica sand has been produced in the following counties of the State: Alameda, Amador, Contra Costa, El Dorado, Imperial, Inyo, Los Angeles, Mariposa, Mono, Monterey, Orange, Placer, Riverside, San Diego, San Joaquin and Tulare, the chief centers being Contra Costa, Amador, Monterey and Los Angeles counties. The industry is of limited importance, so far, because of the fact that much of the available material is not of a grade which will produce first-class colorless glass; for such, it must be essentially iron-free. Even a fractional per cent of iron imparts a green color to the glass.

The Tariff Act of June 21, 1930, placed a duty on sand, containing 95 per cent or more of *Silica* and not more than six-tenths of 1 per cent of oxide of iron and suitable for use in the manufacture of glass, of \$2 per ton.

#### Total Silica Production in California.

Total silica production in California since the inception of the industry, in 1899, is shown below, being mainly sand:

Year	Tons	Value	Year	Tons	Value
1899.....	3,000	\$3,500	1919.....	18,659	\$101,600
1900.....	2,200	2,200	1920.....	25,324	96,793
1901.....	5,000	16,250	1921.....	10,569	49,179
1902.....	4,500	12,225	1922.....	9,874	31,016
1903.....	7,725	7,525	1923.....	7,964	30,420
1904.....	10,004	12,276	1924.....	6,808	35,006
1905.....	9,257	8,121	1925.....	12,498	96,780
1906.....	9,750	13,375	1926.....	30,010	104,317
1907.....	11,065	8,178	1927.....	24,636	94,762
1908.....	9,255	22,045	1928.....	14,814	66,679
1909.....	12,259	25,517	1929.....	18,686	79,210
1910.....	19,224	18,265	1930.....	17,802	71,380
1911.....	8,620	8,672	1931.....	43,330	182,769
1912.....	13,075	15,404	1932.....	33,997	136,324
1913.....	18,618	21,899	1933.....	70,329	266,520
1914.....	28,538	22,688	1934.....	70,432	296,643
1915.....	28,904	34,322	1935.....	70,835	297,272
1916.....	20,880	48,908	1936.....	77,830	310,278
1917.....	19,376	41,166			
1918.....	23,257	\$88,930	Totals.....	828,904	\$2,767,414



## SILLIMANITE-ANDALUSITE-KYANITE GROUP

*Bibliography:* State Mineralogist Reports XX, XXIII, XXIV, XXVII. Bulletins 67, 91. Dana's Mineralogy. U. S. Geol. Surv., Prof. Paper 110. U. S. Bureau of Mines, Inform. Circ. 6255. Eng. & Min. Jour.-Press, Vol. 120, pp. 91-94, 1925. Amer. Mineralogist, June, 1924.

Sillimanite and andalusite are both aluminum silicates ( $\text{Al}_2\text{SiO}_5$ ), having the same composition and formula, but with slightly different physical characteristics. Though both crystallize in the orthorhombic system, their crystal habits are different. A massive deposit of andalusite, found in Dry Creek Canyon in the White Mountains of the Inyo Range, in Mono County, is being mined by the Champion Spark Plug Company of Detroit, Michigan. The material is shipped East and utilized in the manufacture of porcelain for automobile spark plugs, for other high-tension electric insulators, laboratory ware and porcelain. Porcelain made from these minerals can be subjected to sudden and extreme changes in temperature without damage.

Kyanite is also an aluminum silicate ( $\text{Al}_2\text{SiO}_5$ ), of the same chemical composition as andalusite and sillimanite, but crystallizing in the triclinic system. A deposit of kyanite is being mined in Imperial County, near Ogilby, by the Vitrefrax Corporation and shipments made to their refractory plant in Los Angeles.

Dumortierite, though different somewhat in composition from the above, being a basic aluminum silicate ( $\text{HAl}_3\text{BSi}_3\text{O}_{20}$ ), has proved similar in behavior in ceramic work so that it is now being mixed with andalusite for electrical porcelains. A deposit of this mineral in Nevada is being mined for that purpose. Occurrences of massive dumortierite are known in Imperial and San Diego counties in this State and there may yet be some commercial possibilities for them.

Total Sillimanite Group Production of California, by Years

Year	Tons	Value
1922}		
1923}*		
1924}	4,584	\$98,790
1925}		
1926}*	4,810	203,000
1927}		
1928}*	4,276	76,000
1929}		
1930}*	4,359	198,893
1931}		
1932}*	1,244	21,800
1933}		
1934}*	3,035	69,026
1935}		
1936}*	3,112	89,214
Totals	25,420	\$756,723

\* Annual details concealed under 'Unapportioned.'

## SOAPSTONE and TALC

*Bibliography:* State Mineralogist Reports XII, XIV, XV, XVII-XXVII (inc.), XXX. Bulletins 38, 67, 91. U. S. Bur. of Mines, Bulletin 213. Rep. of Investigations, Serial No. 2253, May, 1921.

The total output of talc and soapstone in California during 1936 amounted to 25,643 short tons valued at \$309,287. This was an increase

in both quantity and value over the 1935 figures, which were 17,332 tons and \$170,830. Of the 1936 production, 23,475 tons were high-grade tale from Inyo and San Bernardino counties, which material was utilized mainly in toilet powders, paint, paper, and rubber manufacture, and some in ceramics. The remainder of 2168 tons was soapstone and came from Butte, El Dorado and Los Angeles counties.

The 'soapstone' grades were used mainly for roofing granules and as a filler in roofing paper and part also in magnesite cement.

It is reported that California tale has replaced to some extent imported tale in the toilet trade on the basis of quality. The largest production of tale in the United States comes from Vermont and New York and of massive soapstone from Virginia.

During 1936 imports of tale steatite, etc., totaled 24,520 short tons valued at \$456,667, as compared with 23,897 tons worth \$492,274 during 1935, according to the United States Bureau of Foreign and Domestic Commerce.

The Tariff Act of 1930 places a duty on tale, steatite or soapstone and French chalk, crude or unground, of one-fourth of one cent per pound.

#### Talc Production of California, by Years.

Production was intermittent in the State up to 1912; but there has been a material growth since 1916, as shown in the following table:

Year	Tons	Value	Year	Tons	Value
1893.....	400	\$17,750	1916.....	1,703	\$9,831
1894.....			1917.....	5,267	45,279
1895.....	25	375	1918.....	11,780	85,534
1896.....			1919.....	8,764	115,091
1897.....			1920.....	11,327	221,362
1898.....			1921.....	8,752	130,078
1899.....			1922.....	13,378	197,186
1900.....			1923.....	17,439	252,661
1901.....	10	119	1924.....	16,179	242,770
1902.....	14	288	1925.....	15,465	239,084
1903.....	219	10,124	1926.....	17,004	255,645
1904.....	228	2,315	1927.....	16,218	164,744
1905.....	300	3,000	1928.....	18,668	251,372
1906.....			1929.....	18,676	193,493
1907.....			1930.....	15,861	154,258
1908.....	3	48	1931.....	13,472	109,940
1909.....	33	280	1932.....	10,690	122,880
1910.....	740	7,260	1933.....	14,451	153,668
1911.....			1934.....	13,920	158,606
1912.....	1,750	7,350	1935.....	17,332	170,830
1913.....	1,350	6,150	1936.....	25,643	309,287
1914.....	1,000	4,500			
1915.....	1,663	14,760	Totals.....	299,704	\$3,757,908

#### STRONTIUM

*Bibliography:* State Mineralogist Report XXVI, XXVII, Bulletins 67, 91. U. S. G. S. Bull. 540; 660-I.

There has been no production of strontium minerals in California since 1918, though in that year both celestite ( $\text{SrSO}_4$ ), and the carbonate, strontianite ( $\text{SrCO}_3$ ) were shipped. The first recorded commercial output of strontium minerals in California was in 1916. The occurrence of the carbonate is particularly interesting and valuable, as it appears to be the only considerable deposit of commercial importance so far opened up in the United States. Shipments reported as averag-

ing 80%  $\text{SrCO}_3$  have been made. The deposit is associated with deposits of barite near Barstow, San Bernardino County. The carbonate has also been found in massive form near Shoshone, Inyo County. In addition to Imperial County, celestite is found near Calico and Ludlow, and in the Avawatz Mountains in San Bernardino County, but as yet undeveloped.

Production of strontium minerals in California, by years, has been as follows:

Year	Tons	Value
1916 -----	57	\$2,850
1917 -----	3,050	37,000
1918 -----	2,900	33,000
1919 -----		
Totals -----	6,007	\$72,850

## SULPHUR

*Bibliography:* State Mineralogist Reports IV, XIII, XIV, XXV. Bulletins 38, 67, 91.

During 1936 there was a single producer of sulphur in California, the material coming from Inyo County. The annual details are concealed in the 'Unapportioned' item so as not to reveal the output of the operator. For the two years, 1935-1936, the production totaled 5,308 short tons valued at \$61,603.

The 1929-1931 output, which came from Colusa County, was utilized in the manufacture of a fertilizer and for dusting for mildew. The last previous production was in 1923 and 1924 and came from Kern County. This mineral has been found to some extent in Alpine, Colusa, Imperial, Inyo, Kern, Lake, Sonoma, Tehama, and Ventura counties.

## Total Production of Sulphur in California.

Sulphur was produced at the famous Sulphur Bank mine in Lake County, during the years 1865-1868 (inc.); following which the property became more valuable for its quicksilver. The Elgin quicksilver mine, near Wilbur Springs, Colusa County, is a similar occurrence.

Production of sulphur in California to date:

Year	Tons	Value
1865 } -----		
1866 } * -----	941	\$53,500
1867 } -----		
1868 to 1922 -----	----	-----
1923 } * -----	185	4,071
1924 } -----		
1925 to 1928 -----	----	-----
1929 } -----		
1930 } * -----	265	9,025
1931 } -----		
1932 } * -----	1,991	32,838
1933 } -----		
1934 -----	4,412	67,656
1935 } * -----	5,308	61,603
1936 } -----		
Totals -----	13,102	\$228,693

\* Annual details concealed under 'Unapportioned.'



### WOLLASTONITE

During 1936 there were no commercial shipments of wollastonite reported in California. In 1934 there was production coming from a single property in Kern County. The annual details are concealed in the 'Unapportioned' item so as not to reveal the output of the single operator.

The first commercial production of wollastonite was made in 1933 from a deposit operated by John T. Thorndyke in the Radmacher District in Kern County, and was shipped from Code's Siding to Los Angeles, where it is used to manufacture mineral wool. This was done by a new process in an electric furnace where the material is melted without the use of a flux and then blown to a fine fiber or wool by compressed air from jets. Mineral wool is an excellent insulating material for sound, heat and cold, and the manufacturer expects to use large quantities in proposed steel houses. This material, also, can be used in the manufacture of unbreakable glass. This is the first recorded commercial production of wollastonite in California, and apparently also the first in the United States.

Wollastonite is a calcium metasilicate ( $\text{CaSiO}_3$ ) and usually found in crystalline limestone at the contact with intrusive igneous rocks. It is a white to gray mineral, having a hardness of  $4\frac{1}{2}$  to 5 and a specific gravity of about 2.9.

## CHAPTER SIX

## SALINES

*Bibliography:* State Mineralogist Reports III, XIV, XV, XVII-XXIX (inc.). Bulletin 24. Spurr and Wormser, "Marketing of Minerals." "Non-Metallic Minerals," by R. B. Ladoo. "Industrial Minerals and Rocks," A. I. M. E., 1937. See also under each substance.

Under this heading are included borax, common salt, soda, potash, and other alkaline salts. The first two have been produced in a number of localities in California, more or less regularly since the early sixties. Except for a single year's absence, soda has had a continuous production since 1894. Potash, magnesium chloride and sulphate, and calcium chloride have been added to the commercial list in recent years, joined in 1926 by bromine, and in 1931 by iodine. The nitrates are still prospective.

Our main resources of salines are the lake beds of the desert regions of Imperial, Inyo, Kern, Los Angeles, San Bernardino, and San Luis Obispo counties, and the waters of the Pacific Ocean.

The total value of this group showed an increase from \$9,700,802 in 1935 to \$12,416,349 in 1936. The following table gives details for each year:

Substance	1935		1936		Increase+ Decrease— Value
	Amount	Value	Amount	Value	
Borates.....	280,249 tons	\$4,602,064	313,389 tons	\$5,911,093	\$1,309,029+
Magnesium salts.....	2,795 tons	235,531	3,798 tons	347,838	112,307+
Salt.....	365,711 tons	1,230,480	398,249 tons	1,227,505	2,975—
Soda.....	125,504 tons	1,341,045	144,314 tons	1,412,788	71,743+
Unapportioned.....		\$2,291,682		\$3,517,125	1,225,443+
Total values.....		\$9,700,802		\$12,416,349	
Net increase.....					\$2,715,547+

\* Includes bromine, calcium chloride, iodine and potash.

## BORATES

*Bibliography:* State Mineralogist Reports III, X, XII-XV (inc.), XVII-XXIX (inc.), XXV-XXVII (inc.). Bulletins 24, 67, 91.

During 1936 there was produced in California a total of 319,658 tons of borate materials compared with 263,915 tons for the year 1935. The material shipped during the year included the new sodium borates, kernite (rasorite), Kramerite from Kern County; also crystallized borax prepared by evaporation of brines at Searles Lake in San Bernardino County and Owens Lake in Inyo County.

As the crude ore is not sold as such, but is almost entirely calcined before shipping to the refinery for conversion into the borax of com-

merce, and because of the fact that the material varied widely in boric acid content, we have recalculated the tonnage to a basis of 40 per cent, A. B. A. This is approximately the average A. B. A. content of colemanite material after calcining, and also of the crystallized borax obtained from evaporation of the lake brines.

Recalculated as above, the 1936 production totaled 313,389 short tons valued at \$5,911,093. This was an increase both in quantity and value over the 1935 output, which was 280,249 tons worth \$4,602,064.

The total amount of borates exported from the United States<sup>1</sup> during the year 1936 was 102,021 tons valued at \$3,119,850 as compared with 114,447 tons worth \$3,242,350 in 1935.

#### **Total Production of Borate Materials in California.**

Borax was first discovered in California in the waters of Tuscan Springs in Tehama County, January 8, 1856. Borax Lake in Lake County was discovered in September of the same year by Dr. John A. Veach. This deposit was worked in 1864-1868, inclusive, and during that time produced 1,181,365 pounds of refined borax. The bulk of it was exported by sea to New York. This was the first commercial output of this salt in the United States, and California is still today the leading American producer of borax, having been for many years the sole producer.

Production from the dry lake 'playa' deposits of Inyo and San Bernardino counties began in 1873; but it was not until 1887 that the borax industry was revolutionized by the discovery of the colemanite beds at Calico, in San Bernardino County and later similar beds in Inyo and Los Angeles counties. The colemanite deposits of Ventura County were not worked extensively, owing to lack of transportation facilities. Some production of colemanite has been made from deposits opened up in Clarke County, Nevada. Colemanite was in turn, displaced by the discovery in 1926 of kernite (rasorite) a sodium borate, near Kramer in Kern County.

The total production of borate materials in California is shown in the following table:

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<sup>1</sup> Monthly Summary of Foreign Commerce of the United States, Department of Commerce, Dec., 1936, Part 1.



Total Production of Borate Materials in California

Year	Tons	Value	Year	Tons	Value
1864	12	\$9,478	1902	117,202	\$2,234,994
1865	126	94,099	1903	34,430	661,400
1866	201	132,538	1904	45,647	698,810
1867	220	156,137	1905	46,334	1,019,158
1868	32	22,384	1906	58,173	1,182,410
1869			1907	53,413	1,200,913
1870			1908	22,200	1,117,000
1871			1909	16,628	1,163,960
1872	140	89,600	1910	16,828	1,177,960
1873	515	255,440	1911	50,945	1,456,672
1874	915	259,427	1912	42,135	1,122,713
1875	1,168	289,080	1913	58,051	1,491,530
1876	1,437	312,537	1914	62,500	1,483,500
1877	993	193,705	1915	67,004	1,663,521
1878	373	66,257	1916	103,523	2,409,375
1879	364	65,443	1917	109,944	2,561,958
1880	609	149,245	1918	88,772	1,867,908
1881	690	189,750	1919	66,791	1,717,192
1882	732	201,300	1920	127,065	2,794,206
1883	900	265,500	1921	50,136	1,096,326
1884	1,019	198,705	1922	39,087	1,068,025
1885	942	155,430	1923	62,667	1,893,798
1886	1,285	173,475	1924	52,070	1,599,149
1887	1,015	116,689	1925	46,124	1,526,938
1888	1,405	196,636	1926	47,605	1,625,298
1889	965	145,473	1927	72,462	3,043,260
1890	3,201	480,152	1928	109,722	3,378,552
1891	4,267	640,000	1929	144,678	3,312,085
1892	5,525	838,787	1930	209,869	3,686,817
1893	3,955	593,292	1931	206,405	5,753,037
1894	5,770	807,807	1932	179,356	2,856,470
1895	5,959	595,900	1933	197,495	3,019,513
1896	6,754	675,400	1934	240,696	5,524,262
1897	8,000	1,080,000	1935	280,249	4,602,064
1898	8 300	1,153,000	1936	313,389	5,911,093
1899	20,357	1,139,882			
1900	25,837	1,013,251	Totals	3,475,799	\$92,660,046
1901	22,221	982,380			

1 Refined borax.    2 Recalculated to 40% 'anhydrous boric acid' equivalent beginning with 1922.

BROMINE

The first commercial production of bromine and bromine compounds was begun during 1926 by the California Chemical Corporation in its plant at Chula Vista, San Diego County, from salt-works bittern waters. This same plant has been recovering magnesium chloride for a number of years. Bromine is also now being made at a similar bittern-water plant at Newark, Alameda County. The 1936 output showed a decreased value with a slight increase in amount as compared with 1935 production; annual details of which are concealed under the 'Unapportioned' item to conceal the production of the single company which operated both plants.

The total commercial production of bromine in California is as follows:

Year	Tons	Value
1926)		
1927)*	158	\$120,480
1928)		
1929)		
1930)*	802	552,933
1931)		
1932)		
1933)*	559	146,547
1934)		
1935)*	805	191,465
1936)		
Totals	2,324	\$1,011,425

\* Annual details concealed under 'Unapportioned.'

## CALCIUM CHLORIDE

*Bibliography:* U. S. Geol. Surv., Min. Res. 1919, Pt. II. Engineering and Contracting, Roads and Streets, monthly issue, Feb. 6, 1924. 'How to Maintain Roads,' manual of instruction of Dow Chemical Company.

Calcium chloride is hydroseopic, that is, it has an affinity for water. This property is taken advantage of by utilizing this salt as a drying agent. During 1936 the production of calcium chloride in California came from one plant in San Bernardino County. The annual details are combined under the 'Unapportioned' item to conceal the output of the operator.

## Total Calcium Chloride Production in California.

Commercial production of calcium chloride in California was first reported to the State Mining Bureau in 1921, from two plants in San Bernardino County, being obtained as a by-product in the refining of salt from deposits in certain of the desert dry lakes. Total production in California is shown in the following tabulation:

Year	Tons	Value
1921.....	683	\$22,980
1922.....		
1923.....	1,204	26,580
1924.....	10,988	328,876
1925.....		
1926.....	34,195	508,748
1927.....		
1928.....	12,020	114,080
1929.....		
1930.....	9,688	103,237
1931.....		
1932.....	3,103	15,500
1933.....		
1934.....	4,048	16,196
1935.....	.	.
1936.....		
Totals.....	75,929	\$1,136,197

\* Annual details concealed under 'Unapportioned.'

## IODINE

*Bibliography:* U. S. Bureau of Mines I. C. 6387.

In 1936 the output of iodine in California came from two plants in Los Angeles County and showed an increase in both quantity and value over 1935. The annual details for 1936 are concealed under the 'Unapportioned' item to conceal the output of either operator. The combined 1935-1936 production came from three plants in Los Angeles County, and amounted to 487,401 pounds, valued at \$379,702.

## Total Iodine Production in California:

Iodine was first produced in California during 1917 to 1921 as a by-product of potash which was reduced from kelp in an experimental station of U. S. Department of Agriculture at Summerland, but after the armistice the demand for these minerals decreased so that the plant in Santa Barbara County closed. In 1929 the General Salt Company erected a plant which reduces iodine from the waste waters

of certain deep oil wells in the Long Beach field. During 1933 two more plants started operation, making a total of three producing plants in the State.

Year	Pounds	Value
1929		
1931		
1933	696,297	\$1,374,311
1934	355,279	423,016
1935	487,401	379,702
1936		
Totals	\$1,538,977	\$2,177,029

\* Annual details concealed under 'Unapportioned'.

### MAGNESIUM SALTS

*Bibliography:* State Mineralogist Reports XX, XXI, XXV-XXVI (inc.). Bulletin 91. 'Dictionary of Applied Chemistry,' by Thorpe. U. S. Geol. Surv., Min. Res. of P. S.

During 1936 there was an output of magnesium salts in California coming from one plant in San Diego County and two in San Mateo County, amounting to 3798 short tons valued at \$347,838 and consisted of the chloride and carbonate. The 1936 production was an increase in both amount and value over that of 1935 which was 2785 tons worth \$235,531, which also was the chloride and the carbonate. The chloride was nearly all sold for use in magnesite stucco and cement mixtures (Sorel cement), also some for road liquor. The carbonate, a bulky white powder, was used as a heat-insulating material, as a filler for rubber, paper, paint, etc., and in medicines, in tooth paste, in face powder and as a polish for metal and glass. The sulphate marketed in past years was utilized for medicinal and bath purposes. The material coming from San Diego County was residual bitterns from the salt plants and was in part marketed in the liquid form carrying from 35% to 67%  $MgCl_2$  and in part as dry crystals, while that from San Mateo County was magnesium carbonate.

The average value reported for the chloride produced in California in 1936 was approximately \$29.16 per ton, f.o.b. plant.

#### Total Production of Magnesium Salts in California.

Commercial production of magnesium chloride in California was begun in 1916 by some of the salt companies, from the residual bitterns obtained during the evaporation of sea water for its sodium chloride. In addition, some magnesium sulphate, or 'epsom salts' has also been made, but in smaller amount, and magnesium carbonate by a patented process, direct from sea water.

The total production of magnesium salts in California, since the beginning of the industry here, is shown in the following tabulation:



Year	Tons	Value
1916.....	851	\$6,407
1917.....	1,064	34,973
1918.....	1,008	29,955
1919.....	1,616	82,457
1920.....	3,150	107,787
1921.....	4,153	106,140
1922.....	3,036	89,788
1923.....	3,662	116,031
1924.....	4,823	145,883
1925.....	4,221	132,553
1926.....	4,881	124,470
1927(*).....	6,241	139,589
1928).....		
1929(*).....	4,914	333,906
1930).....		
1931).....		
1932).....	2,749	217,979
1933.....	2,073	159,660
1934.....	2,325	194,642
1935.....	2,785	235,531
1936.....	3,798	347,838
Totals.....	57,350	\$2,605,589

\* Annual details concealed under 'Unapportioned.'

### NITRATES

*Bibliography:* State Mineralogist Reports XV, XXV, XXVI, XXVII. Bulletins 24, 67, 91. U. S. G. S., Press Bulletin No. 373, July, 1918. Smithsonian Inst., Publ. No. 2421, 1916.

Nitrates of sodium, potassium and calcium have been found in various places in the desert regions of the State, but no deposit of commercial value has been developed as yet. It is hoped that a closer search may some day be rewarded by workable discoveries. At present the principal commercial source of nitrates is the Chilean saltpeter (sodium nitrate) deposits in South America.

The fixation of atmospheric nitrogen electrically has been accomplished successfully in Germany and Scandinavia. The possibilities of cheap hydroelectric power in California make the subject one of interest to us, as we have also the natural raw materials and chemicals to go with the power. Sodium and potassium cyanides can be made by fixation of atmospheric nitrogen electrically.

### POTASH

*Bibliography:* State Mineralogist Reports XV, XVIII, XX, XXII, XXV-XXVII (inc.). Bulletins 24, 67, 91. U. S. G. S., Min. Res. 1913, 1914, 1915. Senate Doc. No. 190, 62 Congress, 2d Session. Mining & Sci. Press, Vol. 112, p. 155; Vol. 114, p. 789. Eng. & Min. Jour.-Press, Vol. 117, p. 557, Apr. 5, 1924.

The 1936 production of potash in California came from a single operator in San Bernardino County, the details of which are concealed under the 'Unapportioned' item. This was principally chloride and the product averaged 60% equivalent  $K_2O$  content. The material was sold mainly for fertilizer manufacture.

Imports of crude potash minerals and salts in the United States during 1936 according to the U. S. Bureau of Foreign and Domestic Commerce, amounted to 422,956 long tons, valued at 9,990,250, compared with 520,577 long tons worth \$10,164,029 in 1935. These

materials consisted mainly of 'manure salts,' crude chloride (muriate) and sulphate, and kainite, all of which are admitted duty free.

Quotations have recently ranged from \$36.25 per ton c.i.f. Atlantic and Gulf ports for high grade sulphate (90%-95%), and \$16.50 for manure salts (30%).

#### Total Production of Potash in California.

Potash production began commercially in California in 1914, with a small yield from kelp. Practically all of the output now comes from deposits of potash-bearing residues and brines in the old lake beds of the desert regions, particularly Searles Lake, San Bernardino County. A small amount has been made from salt-works bitterns, and for a time there was some from Portland cement dust. Some also has been obtained from molasses distillery-slops char.

The annual amounts and values of these potash materials, since their beginning in California in 1914, have been as follows:

Year	Tons	Value
1914	10	\$460
1915	1076	19,391
1916	17,808	663,605
1917	129,022	4,202,889
1918	49,381	6,808,976
1919	28,118	2,415,963
1920	26,298	1,465,463
1921	14,806	390,210
1922	17,776	584,388
1923	29,597	709,836
1924	33,107	747,407
1925	36,355	829,770
1926	32,884	812,285
1927	67,340	1,952,852
1928} •	178,680	5,522,350
1929} •		
1930} •	172,263	5,500,536
1931} •		
1932} •	153,147	3,932,721
1933} •		
1934} •	355,604	3,750,809
1935} •		
1936	*	*
Totals	1,242,372	\$39,315,911

• Annual details concealed under 'Unapportioned.'

#### SALT

*Bibliography:* State Mineralogist Reports II, XII-XV (inc.), XVII-XXIII (inc.), XXV-XXVII. Bulletins 24, 67, 91. U. S. Geol. Survey, Bull. 669. U. S. Bur. of Mines, Bull. 146.

Most of the salt production in California is obtained by evaporation of water of the Pacific Ocean, plants being located on the shores of San Francisco, Monterey, and San Diego bays, and at Long Beach. Additional amounts are derived from lakes and lake beds in the desert regions (in part, rock salt), mainly in Imperial, Kern, and San Bernardino counties, and evaporation of alkaline lake water in Modoc County. A small amount of valuable medicinal salts has been obtained by evaporation of the water of Lake Mono, Mono County.

During 1936 there was an output in California of 398,249 short tons of salt worth \$1,227,505 compared with 365,711 tons worth \$1,230,480 in 1935. There were eleven companies operating plants in 1936—two in San Bernardino County and one each in Alameda, Imperial, Kern, Los Angeles, Modoc, Monterey, Orange, San Diego, and San Mateo.

The average value reported for salt produced in California during 1936 was \$3.08 per ton f.o.b. plant, compared with \$3.36 in 1935; \$3.68 in 1934; \$3.89 in 1933; and \$3.58 in 1932.

#### Production of Salt in California, by Years.

Although salt has been made in California since the early '60's, there are no definite or authenticated records for the earlier years before the beginning of the statistical tabulations by the State Mining Bureau.

Amount and value of annual production of salt in California from 1887 is shown in the following tabulation:

Year	Tons	Value	Year	Tons	Value
1887.....	28,000	\$112,000	1913.....	204,407	\$462,681
1888.....	30,800	92,400	1914.....	223,806	583,553
1889.....	21,000	63,000	1915.....	169,028	368,737
1890.....	8,729	57,085	1916.....	186,148	455,695
1891.....	20,094	90,303	1917.....	227,825	584,373
1892.....	23,570	104,788	1918.....	212,076	806,328
1893.....	50,500	213,000	1919.....	233,994	896,963
1894.....	49,131	140,087	1920.....	230,638	972,648
1895.....	53,031	150,576	1921.....	197,999	832,702
1896.....	64,743	153,244	1922.....	223,238	819,187
1897.....	67,851	157,520	1923.....	275,979	1,130,670
1898.....	93,421	170,855	1924.....	318,800	1,159,137
1899.....	82,654	149,588	1925.....	284,068	949,826
1900.....	89,338	204,754	1926.....	311,761	1,124,978
1901.....	126,218	366,376	1927.....	263,028	639,127
1902.....	115,208	205,876	1928.....	340,580	1,024,656
1903.....	102,895	211,365	1929.....	392,039	2,665,436
1904.....	95,968	187,300	1930.....	347,945	1,167,487
1905.....	77,118	141,925	1931.....	330,951	1,233,567
1906.....	101,650	213,228	1932.....	256,353	918,480
1907.....	88,063	310,967	1933.....	321,312	1,251,024
1908.....	121,764	281,469	1934.....	332,194	1,222,810
1909.....	155,680	414,708	1935.....	365,711	1,230,480
1910.....	174,920	395,417	1936.....	398,249	1,227,505
1911.....	173,332	324,255			
1912.....	185,721	383,370	Totals.....	8,848,518	\$29,023,506

#### SODA

*Bibliography:* State Mineralogist Reports XII, XIII, XV, XVII, XVIII, XX, XXII, XXIII, XXV-XXIX (inc.). Bulletins 24, 67, 91. U. S. Geol. Surv., Bull. 717.

The production of sodium salts in California in 1936 included: Soda ash, trona, caustic soda, and bicarbonate from plants at Owens Lake, Inyo County; and soda ash, salt cake, and trona ('sesqui-carbonate,' a double salt of  $\text{Na}_2\text{CO}_3$  and  $\text{NaHCO}_3$ ) from Searles Lake, San Bernardino County. There were no shipments of salt cake (sulphate) from Carrizo Plains, San Luis Obispo County.

The output for 1936 amounted to 144,314 short tons valued at \$1,412,788, as compared with 125,504 tons worth \$1,341,045 in 1935.

The dense ash and bicarbonate were used mainly in the manufacture of soap, glass, paper, oil refining, sugar refining, and chemicals; and the trona for metallurgical purposes.



## Soda Production of California, by Years.

The total output, showing amount and value of these materials in California since the inception of the statistical records of the State Mining Bureau, is given in the table which follows:

Year	Tons	Value	Year	Tons	Value
1894.....	1,530	\$20,000	1917.....	24,505	\$928,578
1895.....	1,900	47,500	1918.....	20,447	855,423
1896.....	3,000	65,000	1919.....	21,294	721,958
1897.....	5,000	110,000	1920.....	32,407	1,164,898
1898.....	7,000	154,000	1921.....	14,828	438,996
1899.....	10,000	250,000	1922.....	20,084	573,661
1900.....	1,000	50,000	1923.....	34,885	764,284
1901.....	8,000	400,000	1924.....	32,536	711,796
1902.....	7,000	50,000	1925.....	48,625	947,649
1903.....	18,000	27,000	1926.....	63,333	1,305,802
1904.....	12,000	18,000	1927.....	62,571	1,478,239
1905.....	15,000	22,500	1928.....	80,838	1,469,297
1906.....	12,000	18,000	1929.....	90,646	1,838,657
1907.....	-----	-----	1930.....	90,122	1,627,344
1908.....	9,600	14,400	1931.....	78,701	1,217,811
1909.....	7,712	11,593	1932.....	58,017	826,369
1910.....	8,125	11,862	1933.....	70,598	1,019,130
1911.....	9,023	52,887	1934.....	99,380	1,219,561
1912.....	7,200	37,094	1935.....	125,504	1,341,045
1913.....	1,861	24,936	1936.....	144,314	1,412,788
1914.....	6,522	115,396			
1915.....	5,799	83,485			
1916.....	10,593	264,825	Totals.....	1,481,500	\$23,711,764

## CHAPTER SEVEN

## BY COUNTIES

**Introductory.**

The State of California includes a total area of 158,297 square miles, of which 155,652 square miles are of land. The maximum width is 235 miles, the minimum 148 miles, and the length from the northwest corner to the southeast corner is 775 miles. The State is divided into fifty-eight counties. The 1930 census figures show a total population for California of 5,672,009. Minerals of commercial value exist in every county, and during 1936 some active production was reported to the State Division of Mines from all of the fifty-eight.

**Rank of Counties in Mineral Yield, 1935.**

Of the ten leading counties in point of total value of mineral output for 1936, the first five, viz., Los Angeles, Kern, Fresno, Orange, and Ventura, also Kings eighth and Santa Barbara ninth, owe their position to petroleum and natural gas. Los Angeles County, due to crude oil, led all other counties in 1936 and is credited with 26% of the State's total mineral value, holding this position since 1923 when it passed Kern, which previously led the State for many years. San Bernardino (sixth) owes its position to cement, borates, and potash. Nevada (seventh) owes its position to gold; and Riverside (tenth) to cement.

There were twenty-six counties having a mineral production valued in excess of a million dollars in 1936, in seven of which petroleum was an important item; in twelve gold; in six each, natural gas and cement; in three, miscellaneous stone; in two, borates; in one each, potash, soda, diatomite, and copper.

In point of variety and diversity San Bernardino County led all others in 1936 with twenty-five different mineral substances on its commercial list, followed by Los Angeles County with twenty; Inyo and Kern each with eighteen; Fresno seventeen; Placer and Riverside each with thirteen; Imperial, Santa Clara, and Tulare each with eleven; Butte, Calaveras, Monterey, Napa, Santa Barbara, Siskiyou, and Tuolumne each with ten.

<i>County</i>	<i>Value</i>
1. Los Angeles -----	\$86,227,432
2. Kern -----	65,344,764
3. Fresno -----	40,245,111
4. Orange -----	22,132,919
5. Ventura -----	17,631,880
6. San Bernardino -----	15,396,166
7. Nevada -----	10,322,695
8. Kings -----	9,949,931
9. Santa Barbara -----	9,693,339
10. Riverside -----	4,449,170
11. Sacramento -----	4,254,685
12. Amador -----	3,617,449
13. Calaveras -----	3,513,180
14. Yuba -----	2,893,823
15. El Dorado -----	2,796,980
16. Alameda -----	2,413,115
17. San Mateo -----	2,410,807
18. Santa Cruz -----	2,103,122
19. Merced -----	2,009,328
20. Plumas -----	1,923,777
21. Contra Costa -----	1,706,131
22. Shasta -----	1,699,902
23. Placer -----	1,554,865
24. Inyo -----	1,470,847
25. Butte -----	1,393,874
26. Mariposa -----	1,130,018
27. Siskiyou -----	831,103
28. Sierra -----	787,634
29. Trinity -----	724,109
30. Tuolumne -----	723,469
31. Stanislaus -----	691,614
32. Santa Clara -----	675,188
33. San Diego -----	582,556
34. Napa -----	567,153
35. Mono -----	498,851
36. San Joaquin -----	461,064
37. San Luis Obispo -----	352,346
38. San Benito -----	348,812
39. Lake -----	341,066
40. Imperial -----	256,941
41. Marin -----	222,974
42. Madera -----	222,592
43. Tulare -----	209,968
44. Monterey -----	187,750
45. Sonoma -----	185,417
46. Glenn -----	134,466
47. Tehama -----	100,403
48. Humboldt -----	78,098
49. Yolo -----	71,609
50. Lassen -----	66,283
51. Solano -----	46,552
52. Mendocino -----	35,596
53. Modoc -----	32,306
54. San Francisco -----	23,870
55. Sutter -----	17,368
56. Del Norte -----	16,776
57. Colusa -----	15,483
58. Alpine -----	9,541
Total value -----	\$327,804,268

## ALAMEDA

*Land area:* 732 square miles.

*Population:* 475,153 (1930 census).

*Location:* East side of San Francisco Bay.

*County seat:* Oakland.

*References:* State Mineralogist Report XVII: XVIII: XX: XXVI (Oct. 1929).

Alameda, while in no sense one of the 'mining counties,' came sixteenth on the list of counties as to value, with a mineral production for 1936 worth \$2,413,115, and had seven different substances. This



was an increase over the 1935 output which was valued at \$2,010,493. Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Brick and hollow building tile-----	-----	\$146,730
Clay, pottery-----	6,612 tons	6,443
Stone, miscellaneous-----	-----	1,222,909
Unapportioned *-----	-----	1,037,033
Total value-----	-----	\$2,413,115

\* Includes bromine, lime, salt.

### ALPINE

*Land area:* 776 square miles.

*Population:* 236 (1930 census).

*Location:* On eastern border of State, south of Lake Tahoe.

*County seat:* Markleeville.

*References:* State Mineralogist Report XV: XVII: XVIII: XXVII (Oct., 1931).

Alpine County ranked fifty-eighth in value of output for 1936, which was \$9,541, compared with \$9,541 in 1935.

Commercial production for 1936 included gold, silver, and miscellaneous stone.

### AMADOR

*Land area:* 601 square miles.

*Population:* 8494 (1930 census).

*Location:* East-central part of State—Mother Lode District.

*County seat:* Jackson.

*References:* State Mineralogist Report XV: XVII: XVIII: XIX: XX: XXIII: (April, 1927): XXX.

Amador County ranked twelfth as to value of mineral output for 1936, with nine different substances worth \$3,614,449, compared with \$2,765,299 in 1935.

Amador at one time led the State in gold production, though exceeded in 1920–1923 and in 1926–1927 by Yuba and Nevada counties; but in 1925 and 1928 by Yuba only, in 1929–1930 by Nevada only, and in 1931–1936 by Nevada and Sacramento.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Clay, pottery-----	52,813 tons	\$91,228
Copper-----	31,542 lbs.	2,902
Gold-----	-----	3,402,350
Lead-----	4,296 lbs.	197
Silver-----	23,365 fine ozs.	18,096
Stone, miscellaneous-----	-----	30,777
Unapportioned *-----	-----	71,899
Total value-----	-----	\$3,617,449

\* Includes brick and coal.

### BUTTE

*Land area:* 1722 square miles.

*Population:* 34,010 (1930 census).

*Location:* North-central portion of State.

*County seat:* Oroville.

*References:* State Mineralogist Report XV: XVII: XVIII: XXIV: XXVI (Oct., 1930): XXXI (Jan., 1936).

Butte County ranked twenty-fifth in regard to value of mineral output in 1936, with ten different substances, having a total value of \$1,393,874, as compared with \$1,009,952 in 1935.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Copper-----	5,008 lbs.	\$460
Gold-----	-----	1,202,460
Silver-----	12,648 fine ozs.	9,796
Stone, miscellaneous-----	-----	174,944
Unapportioned *-----	-----	6,214
Total value-----	-----	\$1,393,874

\*Includes lead, gems (diamonds), mineral water, natural gas, soapstone.

### CALAVERAS

*Land area:* 1027 square miles.

*Population:* 6009 (1930 census).

*Location:* East-central portion of State—Mother Lode District.

*County seat:* San Andreas.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI : XXXII (July, 1936).

Calaveras County ranked thirteenth in California in regard to value of mineral output in 1936, with a total of \$3,513,180, as compared with \$2,312,953 in 1935. The increase was due to gold. Commercial production for 1936 consisting of ten different substances, was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Copper-----	1,814 lbs.	\$167
Gold-----	-----	2,113,055
Lead-----	4,755 lbs.	219
Silver-----	15,806 fine ozs.	12,242
Stone, miscellaneous-----	-----	7,643
Unapportioned *-----	-----	1,379,854
Total value-----	-----	\$3,513,180

\* Includes cement, clay (pottery), mineral water, platinum, slate.

### COLUSA

*Land area:* 1140 square miles.

*Population:* 10,257 (1930 census).

*Location:* Sacramento Valley.

*County seat:* Colusa.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXV : (April, 1929).

Colusa County ranked fifty-seventh in regard to the value of mineral output in 1936 with three different mineral substances, worth a total of \$15,483, as compared with \$1.901 in 1935.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Value</i>
Stone, miscellaneous-----	\$14,206
Unapportioned *-----	1,277
Total value-----	\$15,483

\* Includes mineral water and quicksilver.

**CONTRA COSTA**

*Land area:* 714 square miles.

*Population:* 78,554 (1930 census).

*Location:* East side of San Francisco Bay.

*County seat:* Martinez.

*References:* State Mineralogist Report XVII : XVIII : XXIII (Jan., 1927).

Contra Costa County stands twenty-first on the list in respect to value of mineral output for 1936, with eight different substances worth \$1,706,131, as compared with \$1,361,616 in 1935.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Brick and hollow building tile-----	-----	\$423,887
Clay, pottery-----	14,245 tons	15,931
Stone, miscellaneous-----	-----	428,731
Unapportioned *-----	-----	837,582
Total value-----		\$1,706,131

\* Includes cement, mineral water, quicksilver, silica (glass sand).

**DEL NORTE**

*Land area:* 1024 square miles.

*Population:* 4734 (1930 census).

*Location:* Extreme northwest corner of State.

*References:* State Mineralogist Report XIV:XVII:XXI (July, 1925): XXIX Jan.-April, 1933).

Del Norte County was in fifty-sixth place as to mineral production for 1936, with five different substances worth \$16,776, as compared with \$46,589 in 1935.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Value</i>
Stone, miscellaneous -----	\$12,247
Unapportioned * -----	4,529
Total value -----	\$16,776

\* Includes gold, platinum, silver.

**EL DORADO**

*Land area:* 1753 square miles.

*Population:* 8303 (1930 census).

*Location:* East-central portion of the State, northernmost of the Mother Lode counties.

*County seat:* Placerville.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXII (Oct., 1926) : XXXI.

El Dorado County, which contains the location where gold in California was first heralded to the world, comes fifteenth on the list of counties ranked according to value for 1936, with thirteen different mineral substances worth \$2,796,980. In addition to the segregated figures here given, a large tonnage of limestone was formerly shipped for use in cement manufacture, the value being included in the State's



total for cement. The 1935 output was valued at \$2,388,999. Gold accounts for the increased value.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Copper-----	21,661 lbs.	\$1,993
Gold-----		1,988,735
Limestone-----	159,134 tons	348,055
Silver-----	11,702 fine ozs.	9,063
Stone, miscellaneous-----		77,778
Unapportioned *-----		371,356
Total value-----		\$2,796,980

\* Includes chromite, lead, lime, mineral water, platinum, slate, soapstone.

### FRESNO

*Land area:* 5950 square miles.

*Population:* 144,369 (1930 census).

*Location:* South-central portion of State.

*County seat:* Fresno.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXV (July, 1929).

Fresno County, third in importance as a mineral producer among the counties of California, reports an output for 1936 of seventeen different mineral substances, with a total value of \$40,245,111, as compared with the 1935 value of \$30,016,686.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----		\$15,225
Natural gas-----	60,983,263 M. cu. ft.	3,582,394
Petroleum-----	30,035,864 bbls.	36,317,189
Quicksilver-----	71 flasks	5,362
Silver-----	96 fine ozs.	74
Stone, miscellaneous-----		175,137
Unapportioned *-----		149,730
Total value-----		\$40,245,111

\* Includes brick and hollow building tile, chromite, clay (oil-well drilling mud), copper, feldspar, gems (topaz, garnet), granite, gypsum, limestone (marl), silica (quartz).

### GLENN

*Land area:* 1259 square miles.

*Population:* 10,935 (1930 census).

*Location:* West side of Sacramento Valley.

*County seat:* Willows.

*References:* State Mineralogist Report XIV : XVII : XVIII.

Glenn County stands forty-sixth as a mineral producing county of the State for 1936 and owes its position mainly to the presence of large deposits of sand and gravel, much of which is used as railroad ballast.

Commercial production for 1936 totaled \$134,466, which is an increase over \$41,287, the 1935 total.

## HUMBOLDT

*Land area:* 3634 square miles.

*Population:* 43,189 (1930 census).

*Location:* Northwestern portion of State, bordering on Pacific Ocean.

*County seat:* Eureka.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXI (July, 1925).

Humboldt County ranked forty-eighth in the value of its mineral output among the counties of the State for 1936, with six different mineral substances valued at \$78,098, compared with the 1935 output worth \$85,065.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----	-----	\$36,155
Silver-----	152 fine ozs.	118
Stone, miscellaneous-----	-----	37,829
Unapportioned *-----	-----	3,996
Total value-----	-----	\$78,098

\* Includes brick, clay (pottery), natural gas, gold, silver.

## IMPERIAL

*Land area:* 4089 square miles.

*Population:* 60,894 (1930 census).

*Location:* Extreme southeast corner of the State.

*County seat:* El Centro.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (April, 1926).

Imperial County ranked fortieth in total value of mineral output for 1936, with eleven different mineral substances, worth \$256,941, compared with \$124,135 for 1935.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----	-----	\$41,965
Silver-----	740 fine ozs.	573
Stone, miscellaneous-----	-----	143,530
Unapportioned *-----	-----	70,873
Total value-----	-----	\$256,941

\* Includes carbon dioxide, copper, lead, gypsum, mica (schist), pumice, salt.

## INYO

*Land area:* 10,019 square miles.

*Population:* 6557 (1930 census).

*Location:* Lies on eastern border of State, north of San Bernardino County.

*County seat:* Independence.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXII (Oct., 1926) : XXVII : XXX.

Inyo County's mineral output for 1936 reached a total value of \$1,470,847, having eighteen different mineral substances and standing

twenty-fourth among the counties of the State as to value of production. The 1935 yield was worth \$1,559,806.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Copper-----	57,230 lbs.	\$5,265
Gold-----		744,135
Lead-----	556,399 lbs.	25,594
Pumice and volcanic ash-----	1,567 tons	18,492
Silver-----	51,511 fine ozs.	39,895
Unapportioned *-----		637,466
Total value-----		\$1,470,847

\* Includes bentonite, borates, dolomite, onyx, quicksilver, talc, soda, stone (miscellaneous), sulphur, tungsten, slate.

### KERN

*Land area:* 8003 square miles.

*Population:* 82,219 (1930 census).

*Location:* South-central portion of State.

*County seat:* Bakersfield.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXV (Jan., 1929) : XXIX (July-Oct., 1933) : XXX.

Kern County, because of its immensely productive oil fields, for many years stood preeminent among all counties of California in the value of its mineral output. It was surpassed by Los Angeles and Orange counties in 1923, but by Los Angeles only in 1924-1936, for which petroleum is responsible. The 1936 production consisted of eighteen different mineral substances valued at \$65,344,764, compared with the 1935 output worth \$46,944,409.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Copper-----	1,402 lbs.	\$129
Gold-----		2,401,280
Natural gas-----	58,044,172 M. cu. ft.	3,246,196
Petroleum-----	62,273,932 bbls.	53,781,287
Silver-----	381,654	295,591
Stone, miscellaneous-----		184,696
Unapportioned *-----		5,435,585
Total value-----		\$65,344,764

\* Includes bentonite, borates, brick, cement, clay (oil-well drilling mud), lead, gypsum, mica (sericite), volcanic ash, quicksilver, salt.

### KINGS

*Land area:* 1559 square miles.

*Population:* 25,277 (1930 census).

*Location:* South-central portion of the State.

*County seat:* Hanford.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXVI Oct., 1930).

Kings County, previous to the discovery of Kettleman Hills oil fields in 1928, had little or no mineral output, but in 1929 it ranked ninth in total value of annual mineral production, seventh in 1930, third in 1931, and eighth in 1936.



Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Natural gas-----	47,529,901 M. cu. ft.	\$2,834,058
Petroleum-----	5,317,882 bbls.	7,115,273
Unapportioned-----	-----	600
Total value-----		\$9,949,931

#### LAKE

*Land area:* 1278 square miles.

*Population:* 7166 (1930 census).

*Location:* About fifty miles north of San Francisco Bay and the same distance inland from the Pacific Ocean.

*County seat:* Lakeport.

*References:* State Mineralogist Report XIV : XVII : XVIII : XX : XXV (July, 1929).

Lake County was in thirty-ninth place as to the value of mineral output for 1936, with four different mineral substances, worth \$341,066, compared with \$320,750 for 1935.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Mineral water-----	29,729 gals.	\$12,545
Quicksilver-----	3,795 flasks	292,571
Stone, miscellaneous-----	-----	35,929
Unapportioned-----	-----	21
Total value-----		\$341,066

#### LASSEN

*Land area:* 4531 square miles.

*Population:* 12,587 (1930 census).

*Location:* Northeast portion of State.

*County seat:* Susanville.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Lassen County was in fiftieth place as a mineral producer for 1936, with output as follows, being an increase from \$21,732, which was the value for the previous year:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----	-----	\$31,010
Silver-----	2,343 fine ozs.	1,815
Stone, miscellaneous-----	-----	32,956
Unapportioned-----	-----	502
Total value-----		\$66,283

#### LOS ANGELES

*Land area:* 4067 square miles.

*Population:* 2,201,526 (1930 census).

*Location:* One of the southwestern coast counties.

*County seat:* Los Angeles.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1927) : XXX : XXXIV (July, 1937).

The mineral production for Los Angeles County for the year 1936 amounted in value to \$86,227,432, as compared with 1935 output worth

\$72,148,990. This accounted for 26% of the entire State's total for 1936 and ranked Los Angeles first in the State as a mineral producer.

Commercial production for 1936, consisting of 20 substances, was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Brick-----	72,794 M.	\$1,008,038
Hollow building tile-----	4,517 tons	32,005
Clay, pottery-----	34,207 tons	23,318
Gold-----		177,030
Mineral water-----	9,126,944 gals.	435,842
Natural gas-----	62,611,713 M. cu. ft.	4,689,852
Petroleum-----	72,629,599 bbls.	70,758,648
Silver-----	2,444 fine ozs.	1,893
Stone, miscellaneous <sup>a</sup> -----		8,547,619
Unapportioned *-----		558,187
Total value-----		\$86,227,432

\* Includes cement (see San Bernardino County), copper, diatomite, granite, iodine, limestone, marble, salt, slate, soapstone.

<sup>a</sup>Part of this stone was mined previous to 1936, but not sold.

### MADERA

*Land area:* 2112 square miles.

*Population:* 17,152 (1930 census).

*Location:* East-central portion of State.

*County seat:* Madera.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXIV (Oct., 1928) : XXX : XXXI.

Madera County was in forty-second place as a mineral producer, for 1936, with an output of six different substances valued at \$222,592, compared with \$306,644 for 1935:

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----		\$23,485
Silver-----	233 fine ozs.	180
Stone, miscellaneous-----		44,0 0
Unapportioned *-----		154,907
Total value-----		\$222,592

\* Includes granite and volcanic ash.

### MARIN

*Land area:* 529 square miles.

*Population:* 41,635 (1930 census).

*Location:* Adjoins San Francisco on the north.

*County seat:* San Rafael.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926) : XXIX.

Marin County had forty-first place as to the value of mineral output for 1936, with four different mineral substances. The total was \$222,974, compared with \$113,914 in 1935.

Commercial production for 1936 included brick, mineral water, and miscellaneous stone.

## MARIPOSA

*Land area:* 1453 square miles.

*Population:* 2530 (1930 census).

*Location:* Most southerly of the Mother Lode counties. East central portion of State.

*County seat:* Mariposa.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXIV (April, 1928) : XXXI (Jan., 1935).

Mariposa County is one of the distinctly 'mining' counties of the State, although it stands but twenty-sixth on the list of counties in regard to the value of its mineral output for 1936, with a total of \$1,130,018, as compared with \$873,242 for 1935. Mariposa County is also the source of a large tonnage of limestone annually, which is otherwise credited to cement manufacture in Merced County.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Copper-----	2,350 lbs.	\$216
Gold-----		\$63,485
Silver-----	6,141 fine ozs.	4,756
Stone, miscellaneous-----		160,451
Unapportioned *-----		101,110
Total value-----		\$1,130,018

\* Includes barite, lead, granite.

## MENDOCINO

*Land area:* 3453 square miles.

*Population:* 23,491 (1930 census).

*Location:* Joins Humboldt County on the south and bounded by the Pacific Ocean on the west.

*County seat:* Ukiah.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX.

Mendocino County's mineral output for 1936 was valued at \$35,596, which gave it a rank of fifty-second among the counties of the State as a mineral producer; compared with \$10,429 for 1935.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Value</i>
Stone, miscellaneous -----	\$35,521
Unapportioned -----	75
Total value-----	\$35,596

## MERCED

*Land area:* 1995 square miles.

*Population:* 36,900 (1930 census).

*Location:* About the geographical center of the State.

*County seat:* Merced.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925) : XXXI (Jan. 1935).

Merced County ranks nineteenth as to the value of mineral output for 1936, with eight different substances worth \$2,009,328, compared with \$1,704,775 for 1935.



Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----	-----	\$1,462,160
Silver-----	4,433 fine ozs.	3,433
Stone, miscellaneous-----	-----	20,775
Unapportioned *-----	-----	522,960
Total value-----	-----	\$2,009,328

\* Includes cement, copper, lead, platinum, gold, silver.

#### MODOC

*Land area:* 3823 square miles.

*Population:* 8038 (1930 census).

*Location:* The extreme northeast corner of the State.

*County seat:* Alturas.

*References:* State Mineralogist Report XV : XVII : XVIII :  
XXV (Jan., 1929) : XXX : XXXII (Oct., 1936).

Modoc County, in fifty-third place, with four different mineral substances, reported a commercial production as follows:

<i>Substance</i>	<i>Value</i>
Stone, miscellaneous -----	\$30,249
Unapportioned * -----	2,057
Total value -----	\$32,306

\* Includes gems and salt.

#### MONO

*Land area:* 3030 square miles.

*Population:* 1359 (1930 census).

*Location:* Is bordered by the State of Nevada on the east and is about in the central portion of the State measured on a north and south line.

*County seat:* Bridgeport.

*References:* State Mineralogist Report XV : XVII : XVIII :  
XX : XXIII (Oct., 1927) : XXX.

Mono County, in thirty-fifth place with seven different mineral substances, reported a commercial production for 1936, as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Copper-----	6,748 lbs.	\$621
Gold-----	-----	64,120
Lead-----	16,805 lbs.	773
Silver-----	425,106 fine ozs.	329,245
Stone, miscellaneous-----	-----	18,452
Unapportioned *-----	-----	85,640
Total value-----	-----	\$498,851

\* Includes pumice, andalusite, gold, silver.

#### MONTEREY

*Land area:* 3330 square miles.

*Population:* 53,668 (1930 census).

*Location:* West-central portion of State, bordering on Pacific Ocean.

*County seat:* Salinas.

*References:* State Mineralogist Report XV : XVII : XVIII :  
XIX : XXI (Jan., 1925) : XXXI.

Monterey County produced ten different mineral substances during 1936, having a total value of \$187,810, as compared with \$132,-689 for 1935.

In forty-fourth place, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Quicksilver-----	18 flasks	\$1,373
Stone, miscellaneous-----	-----	130,590
Unapportioned *-----	-----	55,787
Total value-----		\$187,750

\* Includes diatomite, dolomite, gems, gold, natural gas, salt, sandstone.

NAPA

*Land area:* 783 square miles.  
*Population:* 22,832 (1930 census).  
*Location:* Directly north of San Francisco Bay—one of the ‘bay counties.’  
*County seat:* Napa.  
*References:* State Mineralogist Report XIV : XVII : XVIII : XX : XXV (April, 1929).

In 1936 the value of Napa County’s mineral output was \$567,153, placing it in thirty-fourth place in the list of counties, as compared with \$198,156 for 1935.

With ten different mineral substances, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Mineral water-----	55,950 gals.	\$7,245
Quicksilver-----	737 flasks	55,556
Unapportioned *-----	-----	504,352
Total value-----		\$567,153

\* Includes chromite, copper, lead, gold, pumice, sandstone, silver, stone (miscellaneous).

NEVADA

*Land area:* 974 square miles.  
*Population:* 10,589 (1930 census).  
*Location:* North of Lake Tahoe on the eastern border of the State.  
*County seat:* Nevada City.  
*References:* State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXVI (April, 1930) : XXXI : XXXII.

Nevada County, one of the mountain counties of California, for some years alternated with Amador in the gold lead, but both were passed by Yuba in 1918-1921, also 1923. In 1922, 1924, 1929 to 1936, Nevada led all counties in gold output, though it held third place in 1925 and 1928, and second place in 1926 and 1927. Nevada County stands seventh on the list of counties in regard to value of its mineral output for 1936, with eight different mineral substances worth \$10,-322,695, as compared with \$9,195,148 for 1935. The increase was due mainly to gold and silver.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Copper-----	149,673 lbs.	\$13,770
Gold-----	-----	9,897,265
Lead-----	307,272 lbs.	14,134
Silver-----	455,345 fine ozs.	352,665
Stone, miscellaneous-----	-----	41,205
Unapportioned *-----	-----	3,656
Total value-----	-----	\$10,322,695

\* Includes granite and platinum.

### ORANGE

*Land area:* 795 square miles.

*Population:* 118,611 (1930 census).

*Location:* Southwest portion of the State, bordering Pacific Ocean.

*County seat:* Santa Ana.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXI (Jan., 1925) : XXXI.

Orange County, in fourth place as to value of mineral output for 1936, produced thirteen mineral substances, worth \$22,132,919, as compared with \$24,360,634 for 1935.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Clay, pottery-----	20,519 tons	\$62,361
Natural gas-----	21,353,868 M. cu. ft.	1,466,555
Petroleum-----	21,685,351 bbls.	20,321,674
Stone, miscellaneous-----	-----	256,744
Unapportioned *-----	-----	25,582
Total value-----	-----	\$22,132,919

\* Includes brick, copper, lead, zinc, gold, mineral water, salt, silver.

### PLACER

*Land area:* 1395 square miles.

*Population:* 24,442 (1930 census).

*Location:* Eastern border of State directly west of Lake Tahoe.

*County seat:* Auburn.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XX : XXIII (July, 1927) : XXXI : XXXII (Jan., 1936).

Placer County in twenty-third place, with fourteen different mineral substances, had a commercial production for 1936, as follows, compared with \$1,026,451 for the previous year:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Clay, pottery-----	72,817 tons	\$103,457
Copper-----	3,080 lbs.	283
Gold-----	-----	1,366,400
Lead-----	5,178 lbs.	238
Silver-----	20,745 fine qzs.	16,067
Stone, miscellaneous-----	-----	44,459
Unapportioned *-----	-----	23,961
Total value-----	-----	\$1,554,865

\* Includes brick, granite, mineral paint, mineral water, platinum, silica (quartz).



## PLUMAS

*Land area:* 2594 square miles.

*Population:* 7909 (1930 census).

*Location:* Northeastern border of State, south of Lassen County.

*County seat:* Quincy.

*References:* State Mineralogist Report XVI : XVII : XVIII : XIX : XX : XXIV (Oct., 1928) : XXIX : XXX : XXXIV (April, 1937).

Plumas County's mineral output for 1936 with eight different mineral substances was valued at \$1,923,777 as compared with \$414,516 for 1935.

In twentieth place, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Copper-----	9,675,770 lbs.	\$890,171
Gold-----		781,970
Silver-----	284,161 fine ozs.	220,083
Stone, miscellaneous-----		7,495
Unapportioned *-----		24,058
Total value-----		\$1,923,777

\* Includes barite, lead, granite, platinum.

## RIVERSIDE

*Land area:* 7240 square miles.

*Population:* 82,078 (1930 census).

*Location:* Southern portion of State.

*County seat:* Riverside.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXV (Oct., 1929) : XXX : XXXI.

Riverside is the fourth county in the State in size and the tenth in regard to the total value of mineral output for 1936. Within its borders are included mountain, desert, and agricultural land. In point of variety Riverside County showed fourteen different mineral substances commercially produced in 1936 with a total value of \$4,449,170, compared with the 1935 output which was valued at \$2,226,623.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Clay, pottery-----	66,151 tons	\$105,975
Copper-----	6,355 lbs.	585
Gold-----		216,125
Lead-----	53,983 lbs.	2,483
Silver-----	6,232 fine ozs.	4,827
Stone, miscellaneous-----		341,703
Unapportioned *-----		3,777,472
Total value-----		\$4,449,170

\* Includes brick and hollow building tile, cement, gems, gypsum, mica (vermiculite), mineral water, silica (glass sand).

## SACRAMENTO

*Land area:* 983 square miles.

*Population:* 141,915 (1930 census).

*Location:* North-central portion of State.

*County seat:* Sacramento.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXI (Jan., 1925) : XXXI.

Sacramento stands eleventh among the counties of the State as a mineral producer, the output, principally gold, for 1936 being valued at \$4,254,685, as compared with the 1935 production worth \$4,332,628. In regard to gold output alone, this county ranks second, being exceeded only by Nevada, the Sacramento product coming from the dredges. With nine mineral substances, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Brick and hollow building tile	-----	\$116,453
Gold-----	-----	3,660,125
Lead-----	3,141 lbs.	147
Silver-----	4,293 fine ozs.	3,283
Stone, miscellaneous-----	-----	449,373
Unapportioned *-----	-----	25,304
Total value-----		\$1,254,685

\* Includes copper, natural gas, platinum.

### SAN BENITO

*Land area:* 1392 square miles.

*Population:* 11,310 (1930 census).

*Location:* West-central portion of State.

*County seat:* Hollister.

*References:* State Mineralogist Report XV : XVII : XVIII :  
XX : XXII (April, 1926).

San Benito County ranked thirty-eighth among the counties in regard to the value of total mineral production for 1936, having an output worth \$348,812 as compared with \$242,254 for the previous year.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Quicksilver-----	640 flasks	\$50,271
Unapportioned *-----	-----	298,541
Total value-----		\$348,812

\* Includes bentonite, coal, stone (miscellaneous).

### SAN BERNARDINO

*Land area:* 20,157 square miles.

*Population:* 133,827 (1930 census).

*Location:* Southeastern portion of State.

*County seat:* San Bernardino.

*References:* State Mineralogist Report XV : XVII : XVIII :  
XIX : XXVI (July, 1930) : XXVII (July, 1931) : XXX.

San Bernardino, by far the largest county in the State in area, ranked sixth in regard to the value of mineral output for 1936, with a total of \$15,396,166, as compared with the 1935 total of \$9,886,453.

San Bernardino, for several years (except 1918), has led all other counties in the State in point of variety of minerals, producing commercially during 1936 a total of twenty-five different substances.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Bentonite-----	4,974 tons	\$68,062
Clay, pottery-----	9,781 tons	49,291
Copper-----	10,110 lbs.	930
Gold-----	-----	140,105
Lead-----	115,621 lbs.	5,318
Limestone-----	19,046 tons	52,633
Silver-----	235,433 fine ozs.	182,343
Stone, miscellaneous-----	-----	299,357
Unapportioned *-----	-----	14,598,127
Total value-----	-----	\$15,396,166

\* Includes borates, brick, calcium chloride, cement, gems, iron, lime, onyx, mineral water, petroleum, zinc, potash, salt, tungsten, soda, soapstone.

### SAN DIEGO

*Land area:* 4221 square miles.

*Population:* 209,477 (1930 census).

*Location:* Extreme southwest corner of State.

*County seat:* San Diego.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (July, 1925), XXX.

San Diego County ranked thirty-third in the total value of its mineral output for the year 1936 with thirteen different mineral substances on the commercial list. The value for 1936 was \$582,556, as compared with the 1935 output worth \$471,387.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----	-----	\$2,170
Granite-----	14,065 cu. ft.	28,000
Silver-----	16 fine ozs.	12
Stone, miscellaneous-----	-----	313,808
Unapportioned *-----	-----	238,566
Total value-----	-----	\$582,556

\* Includes brick and hollow building tile, bromine, clay (pottery), feldspar, gold, magnesium chloride, mineral water, salt, silica (quartz).

### SAN FRANCISCO

*Land area:* 46½ square miles.

*Population:* 637,212 (1930 census).

*County seat:* San Francisco.

*References:* State Mineralogist Report XVII : XVIII : XX : XXV (April, 1929).

Surprising as it may appear at first glance, San Francisco County is listed among the mineral-producing sections of the State, actual production consisting mainly of crushed rock, sand, gravel, and mineral water.

In fifty-fourth place, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Value</i>
Unapportioned *-----	\$23,870

\* Includes mineral water and miscellaneous stone.



## SAN JOAQUIN

*Land area:* 1448 square miles.

*Population:* 102,871 (1930 census).

*Location:* Central portion of State.

*County seat:* Stockton.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).

San Joaquin County reported a mineral production for 1936 having a total value of \$461,064 as compared with \$416,270 for 1935. In thirty-sixth place, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Natural gas-----	3,104,068 M. cu. ft.	\$294,457
Stone, miscellaneous-----	-----	133,690
Unapportioned *-----	-----	32,917
Total value-----		<hr/> \$461,064

\* Includes brick, gold, silver.

## SAN LUIS OBISPO

*Land area:* 3334 square miles.

*Population:* 29,617 (1930).

*Location:* Bordered by Kern County on the east and the Pacific Ocean on the west.

*County seat:* San Luis Obispo.

*References:* State Mineralogist Report XV : XVII : XVIII : XXI (Oct., 1925) : XXXI (Oct., 1935).

The total value of the mineral production of San Luis Obispo County in 1936, with thirteen different mineral substances, was \$352,346 as compared with \$265,443 in 1935.

In thirty-seventh place, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Quicksilver-----	2,588 flasks	\$196,786
Stone, miscellaneous-----	-----	20,916
Unapportioned *-----	-----	134,644
Total value-----		<hr/> \$352,346

\* Includes brick and hollow building tile, chromite, clay (pottery and oil-well drilling mud), gold, limestone, marble, mineral water, petroleum, volcanic ash, sandstone.

## SAN MATEO

*Land area:* 447 square miles.

*Population:* 77,338 (1930 census).

*Location:* Peninsula, adjoined by San Francisco on the north.

*County seat:* Redwood City.

*References:* State Mineralogist Report XVII : XVIII : XXV (April, 1929) : XXIX.

San Mateo had a mineral output in 1936 of six different substances having a total value of \$2,410,807, as compared with the 1935 production worth \$1,590,159.

In seventeenth place, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Value</i>
Stone, miscellaneous.....	\$101,845
Unapportioned* .....	2,308,962
Total value.....	\$2,410,807

\*Includes cement, limestone (shells), magnesium carbonate, salt.

#### SANTA BARBARA

*Land area:* 2740 square miles.

*Population:* 65,075 (1930 census).

*Location:* Southwestern portion of State, adjoining San Luis Obispo on the south.

*County seat:* Santa Barbara.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XXI (Oct., 1925) : XXXII.

Santa Barbara County owes its position of ninth place in the State in regard to its mineral output to the presence of productive oil fields within its boundaries. The total value of its mineral production during the year 1936 was \$9,693,339, as compared with the 1935 output of \$8,680,173.

With ten different substances, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Natural gas.....	4,562,691 M. cu. ft.	\$319,877
Petroleum.....	7,149,077 bbls.	8,174,953
Stone, miscellaneous.....	-----	80,165
Unappropriated*.....	-----	1,118,344
Total value.....	-----	\$9,693,339

\*Includes bituminous rock, brick, diatomite, marble, mineral water, quicksilver.

#### SANTA CLARA

*Land area:* 1328 square miles.

*Population:* 144,921 (1930 census).

*Location:* West-central portion of State.

*County seat:* San Jose.

*References:* State Mineralogist Report XVII : XVIII : XX : XXVI (Jan., 1930) : XXIX.

Santa Clara County reported a mineral output for 1936 of \$675,188, as compared with the 1935 figures of \$312,676.

In thirty-second place with eleven mineral substances, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Clay, pottery.....	1,714 tons	\$2,590
Quicksilver.....	166 flasks	11,581
Stone, miscellaneous.....	-----	318,475
Unapportioned*.....	-----	342,542
Total value.....	-----	\$675,188

\*Includes brick, gems, gold, limestone (shells), magnesite, petroleum, silver.

## SANTA CRUZ

*Land area:* 435 square miles.

*Population:* 37,405 (1930 census).

*Location:* Bordering Pacific Ocean, just south of San Mateo County.

*County seat:* Santa Cruz.

*References:* State Mineralogist Report XVII : XVIII : XXII (Jan., 1926) : XXIX.

The mineral output of Santa Cruz County, a portion of which is itemized below, amounted to a total of \$2,103,122 for 1936, giving the county a standing of eighteenth among all others in the State in this regard. This is an increase over the 1935 figures of \$1,533,433.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Value</i>
Stone, miscellaneous-----	\$128,407
Unapportioned*-----	1,974,715
Total value-----	\$2,103,122

\*Includes bituminous rock, cement, gold, iron, lime, limestone, silver.

## SHASTA

*Land area:* 3858 square miles.

*Population:* 13,925 (1930 census).

*Location:* North-central portion of State.

*County seat:* Redding.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XXII (April, 1926) : XXIX (Jan., April, 1933) : XXX.

Shasta County stood twenty-second in California among the mineral-producing counties in 1936, with an output valued at \$1,699,902, as compared with the 1935 production worth \$1,350,262.

With seven mineral substances, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----		\$1,304,590
Silver-----	29,329 fine ozs.	22,715
Stone, miscellaneous-----		97,265
Unapportioned*-----		275,332
Total value-----		\$1,699,902

\*Includes copper, lead, platinum, pyrite.

## SIERRA

*Land area:* 923 square miles.

*Population:* 2419 (1930 census).

*Location:* Eastern border of State just north of Nevada County.

*County seat:* Downieville.

*References:* State Mineralogist Report XVI : XVII : XVIII : XX : XXV (April, 1929) : XXXI.

Sierra County reported a mineral production of \$789,634 in 1936 which was mainly gold, as compared with the 1935 output worth \$860,716.



In twenty-eighth place, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----	-----	\$770,945
Silver-----	4,473 fine ozs.	3,464
Unapportioned*-----	-----	13,225
Total value-----	-----	\$787,634

\* Includes copper, lead, miscellaneous stone.

### SISKIYOU

*Land area:* 6256 square miles.

*Population:* 25,505 (1930 census).

*Location:* Extreme north-central portion of State, next to Oregon boundary.

*County seat:* Yreka.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXI (Oct., 1925) : XXVIII (Jan., 1931) : XXIX : XXX : XXXI (July, 1935).

Siskiyou, fifth county in California in regard to size, located in a highly mineralized and mountainous county, ranks twenty-seventh in regard to mineral output with ten mineral substances for 1936. The 1935 production was valued at \$705,737.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Copper-----	1,805 lbs.	\$166
Gold-----	-----	639,030
Pumice-----	6,088 tons	49,200
Silver-----	3,709 fine ozs.	2,873
Stone, miscellaneous-----	-----	106,182
Unapportioned*-----	-----	33,652
Total-----	-----	\$831,103

\*Includes lead, mineral water, platinum, tube-mill pebbles.

### SOLANO

*Land area:* 822 square miles.

*Population:* 40,807 (1930 census).

*Location:* Touching San Francisco Bay on the northeast.

*County seat:* Fairfield.

Solano, while mostly valley land, produced mineral substances during the year 1936 to the total value of \$46,552, ranking it fifty-first among the counties of the State, compared with the 1936 output worth \$7,450.

Commercial production for 1936 included natural gas, onyx and travertine, quicksilver, and miscellaneous stone.

### SONOMA

*Land area:* 822 square miles.

*Population:* 62,248 (1930 census).

*Location:* South of Mendocino County, bordering on the Pacific Ocean.

*County seat:* Santa Rosa.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXII (July, 1926).

Sonoma County ranked forty-fifth among the counties of California during 1936 with a mineral output valued at \$185,417, as compared with the 1935 figures of \$170,800.

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Mineral water-----	29,642 gals.	\$6,460
Quicksilver-----	182 flasks	14,081
Stone, miscellaneous-----	-----	160,068
Unapportioned *-----	-----	4,808
Total value-----		<hr/> \$185,417

\* Includes clay (pottery), gems, granite (tuff).

### STANISLAUS

*Land area:* 1450 square miles.

*Population:* 56,624 (1930 census).

*Location:* Center of State, bounded on south by Merced County.

*County seat:* Modesto.

*References:* State Mineralogist Report XIV : XVII : XVIII : XXI (April, 1925).

Gold has usually been the chief mineral product of Stanislaus County, but it was exceeded in 1918-1919 by manganese, and in 1921-1923 and 1925-1930 by miscellaneous stone. This county for 1936 ranked thirty-first in the State in regard to minerals, with an output valued at \$691,614 as compared with \$585,656 in 1935.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----	-----	\$289,975
Silver-----	989 fine ozs.	766
Stone, miscellaneous-----	-----	177,015
Unapportioned *-----	-----	223,858
Total value-----		<hr/> \$691,614

\* Includes clay (pottery), magnesite, platinum, gold, silver.

### SUTTER

*Land area:* 608 square miles.

*Population:* 14,618 (1930 census).

*Location:* Bounded by Butte County on the north and Sacramento on the south.

*County seat:* Yuba City.

*References:* State Mineralogist Report XV : XVII : XVIII.

Sutter is one of only two counties in the State which for a number of years reported no commercial output of some kind of mineral substance. In 1917 some crushed rock was taken out, from the Marysville Buttes, also in 1925-1928.

There has been some utilization of natural gas and clay. Coal is found here, but no deposits of it have been placed on a productive basis. During 1936, there was a commercial output of pottery clay and natural gas having a total value of \$17,368.

## TEHAMA

*Land area:* 2893 miles.

*Population:* 13,839 (1930 census).

*Location:* North-central portion of the State, bounded on the north by Shasta.

*County seat:* Red Bluff.

*References:* State Mineralogist Report XV : XVII : XVIII : XIX : XXIV (July, 1928).

Tehama County stood forty-seventh among the mineral-producing counties of the State for 1936, with an output valued at \$100,403 as compared with the 1935 yield worth \$11,391.

Commercial production in 1936 included miscellaneous stone.

## TRINITY

*Land area:* 3166 square miles.

*Population:* 2811 (1930 census).

*Location:* Northwestern portion of State.

*County seat:* Weaverville.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXII (Jan., 1926) : XXIX (Jan., April, 1933) : XXX.

Trinity County's 1936 output of minerals was valued at \$724,109 as compared with the 1935 figure of \$745,186, mainly due to gold which gives the county the rank of twenty-ninth for the year.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----	-----	\$708,715
Silver-----	2,907 fine ozs.	2,251
Stone, miscellaneous-----	-----	7,867
Unapportioned *-----	-----	5,276
Total value-----	-----	\$724,109

\* Includes coal, copper, lead, platinum, quicksilver.

## TULARE

*Land area:* 4856 square miles.

*Population:* 77,375 (1930 census).

*Location:* Bounded by Inyo on the east, Kern on the south, Fresno on the north.

*County seat:* Visalia.

*References:* State Mineralogist Report XV : XVII : XVIII : XX.

Tulare County stands forty-third on the list of mineral-producing counties for 1936, with eleven different mineral substances, having a total value of \$209,968, as compared with the 1935 figures of \$53,911.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Lead-----	9,276 lbs.	\$427
Gold-----	-----	840
Silver-----	59 fine ozs.	46
Stone, miscellaneous-----	-----	174,273
Unapportioned *-----	-----	34,382
Total value-----	-----	\$209,968

\* Includes brick, copper, zinc, granite, natural gas, potash.



## TUOLUMNE

*Land area:* 2190 square miles.

*Population:* 9239 (1930 census).

*Location:* East-central portion of State—Mother Lode District.

*County seat:* Sonora.

*References:* State Mineralogist Report XIV : XVII : XVIII : XIX : XX : XXIV (Jan., 1928).

Tuolumne County ranks thirtieth among the counties of the State relative to its total value of mineral output for 1936 with ten different substances. This county ranks first as a producer of marble in the State. The mineral production for 1936 was valued at \$723,469, as compared with \$474,610 for 1935.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Copper-----	10,082 lbs.	\$927
Gold-----	-----	476,105
Silver-----	3,909 fine ozs.	3,028
Stone, miscellaneous-----	-----	71,968
Unapportioned *-----	-----	171,441
Total value-----	-----	\$723,469

\* Includes lead, lime, limestone, marble, slate.

## VENTURA

*Land area:* 1878 square miles.

*Population:* 54,577 (1930 census).

*Location:* Southwestern portion of State, bordering on Pacific Ocean.

*County seat:* Ventura.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXI : XXVIII (July-Oct., 1932).

Ventura is fifth in the State in respect to the value of its mineral output for 1936. The 1936 mineral production was worth \$17,631,880, as compared with the 1935 output valued at \$14,236,946.

With eight different mineral substances, commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----	-----	\$2,345
Natural gas-----	40,545,785 M. cu. ft.	2,125,746
Petroleum-----	15,569,523 bbls.	15,118,061
Silver-----	4 fine ozs.	3
Stone, miscellaneous-----	-----	361,916
Unapportioned *-----	-----	23,809
Total value-----	-----	\$17,631,880

\* Includes brick, clay (oil-well drilling mud).

## YOLO

*Land area:* 1017 square miles.

*Population:* 23,618 (1930 census).

*Location:* Sacramento Valley, bounded by Sutter on the east and Colusa on the north.

*County seat:* Woodland.

*References:* State Mineralogist Report XIV : XVII : XVIII.

Yolo County in forty-ninth place had a commercial production for 1936 as follows, compared with \$34,665 the preceding year:

<i>Substance</i>	<i>Value</i>
Stone, miscellaneous -----	\$71,434
Unapportioned -----	175
Total value -----	\$71,609

### YUBA

*Land area:* 639 square miles.

*Population:* 11,327 (1930 census).

*Location:* Lies west of Sierra and Nevada counties; south of Plumas.

*County seat:* Marysville.

*References:* State Mineralogist Report XV : XVII : XVIII : XX : XXVI (July, 1930) : XXXI.

Yuba County ranked fourteenth among the counties of the State as a mineral producer and fourth in respect to gold, which is obtained mainly by dredges. The 1935 output was valued at \$1,841,221.

Commercial production for 1936 was as follows:

<i>Substance</i>	<i>Amount</i>	<i>Value</i>
Gold-----	-----	\$2,847,530
Silver-----	4,468 fine ozs.	3,460
Stone, miscellaneous-----	-----	37,922
Unapportioned *-----	-----	4,911
Total value-----	-----	\$2,893,823

\* Includes copper and platinum.

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## CHAPTER VIII

### DIRECTORY OF PRODUCERS OF METALLIC AND NONMETALLIC MINERALS IN CALIFORNIA, 1936

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NOTE.—The producers of natural gas and petroleum will be found in the Quarterly Summary of Operations, California Oil Fields, for July, August and September, 1936 (Vol. 22, No. 1).



## BARYTES

Operator	Address	Location of mine
<i>Mariposa County</i> National Pigments Co.	Russ Bldg., San Francisco	El Portal
<i>Plumas County</i> Synthetic Iron Color Co.	P.O. Box 1157, Richmond	Almanor

## BENTONITE (FULLER'S EARTH)

Operator	Address	Location of pit
<i>Inyo County</i> Chamberlain Co., Inc.	2550 E. 9th St., Los Angeles	Olancha
<i>Kern County</i> Muroc Clay Co.	5525 Randolph St., Maywood	Muroc
<i>San Benito County</i> D. L. Stewart Property, A. P. Stewart, Lessee	1052 Vermont St., San Jose	Tres Pinos
<i>San Bernardino County</i> California Talc Co.	837 Jackson St., Los Angeles	Hector
National Lead Co., Nat'l Pigments & Chemical Div.	983 Wilson, Los Angeles	Hector
Pacific Coast Talc Co.	2149 Bay St., Los Angeles	Hector
J. H. Stone	Barstow	Barstow
Hollie H. Thew	515 4th St., San Bernardino	Hector

BITUMINOUS ROCK

Operator	Address	Location of mine
<i>Santa Barbara County</i> Higgins Quarry, D. A. Sattler, Lessee.....	856 Arguello Rd., Santa Barbara.....	Carpinteria
<i>Santa Cruz County</i> Calrock Asphalt Co.....	525 Market St., San Francisco.....	Majors

BORATES

Operator	Address	Location of mine
<i>Inyo County</i> Pacific Alkali Co.....	1209 Pacific Mutual Bldg., Los Angeles.....	Bartlett
<i>Kern County</i> Pacific Coast Borax Co.....	1014 Central Bldg., Los Angeles.....	Kramer
<i>San Bernardino County</i> American Potash and Chemical Corp..... West End Chemical Co.....	Trona..... Syndicate Bldg., Oakland.....	Trona Scarles Lake

BROMINE

Operator	Address	Location of mine
<i>Alameda County</i> California Chemical Co.....	Mills Tower, San Francisco.....	Newark
<i>San Diego County</i> California Chemical Co.....	Mills Tower, San Francisco.....	San Diego

CALCIUM CHLORIDE

Operator	Address	Location of mine
<i>San Bernardino County</i> California Rock Salt Co.....	2465 Hunter St., Los Angeles.....	Amboy

CARBON DIOXIDE GAS

Operator	Address	Location of wells
<i>Imperial County</i> National Dry Ice Co., Pacific-Imperial Dry-Ice, Inc., Carl M. Einhart, Pres.....	Niland Niland.....	Niland Niland



## CEMENT

Operator	Address	Location of mine
<i>Calaveras County</i> Calaveras Cement Co.....	315 Montgomery St., San Francisco	San Andreas
<i>Contra Costa County</i> Henry Cowell Lime and Cement Co.....	2 Market St., San Francisco	Cowell
<i>Keen County</i> Monolith Portland Cement Co.....	Bartlett Bldg., Los Angeles	Monolith
<i>Los Angeles County</i> Blue Diamond Corp.....	1650 S. Alameda St., Los Angeles	Los Angeles
<i>Merced County</i> Yosemite Portland Cement Co.....	Merced	Merced
<i>Riverside County</i> Riverside Cement Co.....	621 S. Hope St., Los Angeles	Riverside
<i>San Bernardino County</i> California Portland Cement Co..... Southwestern Portland Cement Co.....	601 W. Fifth St., Los Angeles 503 Roosevelt Bldg., Los Angeles	Colton Victorville
<i>San Mateo County</i> Pacific Portland Cement Co.....	141 Sutter St., San Francisco	Redwood City
<i>Santa Cruz County</i> Santa Cruz Portland Cement Co.....	Crocker Bldg., San Francisco	Davenport

## CHROMITE

Operator	Address	Location of mine
<i>El Dorado County</i> U. S. Chrome Mines, Inc., Alwyn H. Wild.....	2240 Hyde St., San Francisco	Folsom
<i>Fresno County</i> Bradley & Ekstrom.....	320 Market St., San Francisco	Tollhouse
<i>Napa County</i> C. Circero & Co.....	4261 Twenty-third St., San Francisco	Knoxville
<i>San Luis Obispo County</i> John Fesler.....	Santa Maria	Goldtree

## CLAY—1936

(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
<i>Alameda County</i>			
California Pottery Co.	a, c	Niles	Niles
N. Clark & Sons	a, b	116 Natomas St., San Francisco	Alameda
W. S. Dickey Clay Mfg. Co.,* Livermore Fire Brick Works and California Brick Plant.	a, b, c	116 New Montgomery St., San Francisco	Livermore and Fabrico
Electrical Porcelain Works	a	2416 6th St., Berkeley	Berkeley
Interlocking Tile Co.	a, c	Niles	Niles
Kraftile Co.	a, b	Niles	Niles
M & S Tile Co.	a, c	Decoto	Decoto
Technical Porcelain and China Ware Co.	a	420 Kains Ave., Albany via Berkeley	Albany
Walrich Pottery	a	1285 Hearst Ave., Berkeley	Berkeley
Westinghouse Elec. & Mfg. Co., Emeryville Porcelain Works	a	62d and Green Sts., Emeryville	Emeryville
<i>Amador County</i>			
M. J. Bacon	c	Lone	Carbondale
Cal. Mineral Products Co., Lone Clay and Sand Pit	c, f	Kohl Bldg., San Francisco	Lone
N. Clark & Sons	c	116 Natomas St., San Francisco	Lone
Clay Corp. of California	c	1267 Russ Bldg., San Francisco	Lone
W. S. Dickey Clay Mfg. Co., Lone Clay Pit	c	116 New Montgomery St., San Francisco	Lone
Lone Fire Brick Co., J. T. Roberts, Mgr.	b	1267 Russ Bldg., San Francisco	Lone
Preston School of Industry	b	Lone	Lone
<i>Calaveras County</i>			
California Pottery Co.	c	Niles	Valley Springs
<i>Contra Costa County</i>			
California Art Tile Corp.	a	Box 1116, Richmond	Richmond
Port Costa Brick Works, C. G. Berg, Pres.	b	6th and Berry Sts., San Francisco	Port Costa
Ed Roberts	c, f	Pittsburg	Pittsburg
Standard Sanitary Mfg. Co., H. W. Creger, Mgr.	a	Box W, Richmond	Richmond
Stockton Fire Brick Co.	b	Russ Bldg., San Francisco	Pittsburg
United Materials & Richmond Brick Co., Ltd.	a, b, c	Box 7, Richmond	Richmond
<i>Fresno County</i>			
James M. Coulon Co.	d	322 Transamerica Bldg., Los Angeles	Coalinga
Craycroft Brick Co.	a, b	Griffith-McKenzie Bldg., Fresno	Fresno
<i>Humboldt County</i>			
D. J. Thompson Brick Co.	a, b, c	Box 16, Myrtle Ave., Eureka	Eureka
<i>Inyo County</i>			
Chamberlain Co., Inc.	c	2550 E. 9th St., Los Angeles	Olancha





## CLAY—Continued

(Including producers of crude clay; and manufacturers of brick, tile, porcelain, etc.)

Operator	Remarks	Address	Location of plant or pit
<i>Orange County</i>			
Arnold Clay Mine, I. P. Arnold	c, f	1846 W. 83d St., Los Angeles	El Toro
Gladling, McBean & Co.	c	2901 Los Feliz Blvd., Los Angeles	Hector
La Bolsa Tile Co., A. W. Griffith	a, b, c	R.F.D. 1, Box 174, Huntington Beach	Smeltzer
Mission Clay Products Co.	a, c	Olive	Olive
Tierra Colorado Clay Co.	c	Box 473, San Juan Capistrano	San Juan Capistrano
<i>Placer County</i>			
Clay Corp. of Calif.	c	1267 Russ Bldg., San Francisco	Lincoln
Gladling, McBean & Co.	a, b, c	5th Floor, 660 Mission St., San Francisco	Lincoln
Lincoln Clay Products Co., M. J. Dillman, Mgr.	c	Lincoln	Lincoln
<i>Riverside County</i>			
Alberhill Coat and Clay Co.	c	2406 E. 58th St., Los Angeles	Alberhill
Los Angeles Brick Co.	a, b, c	1078 Mission Rd., Los Angeles	Alberhill
Pacific Clay Products	c	650 Chamber of Commerce Bldg., Los Angeles	Corona
Temescal Clay Co.	c	5601 S. Boyle Ave., Los Angeles	Temescal
<i>Sacramento County</i>			
Cannon & Co.	a, b	Box 802, Sacramento	Ben Ali
H. C. Muddox, Jessie E. Muddox, Owner	a	30th and L Sts., Sacramento	Sacramento
Panama Pottery Co.*	a	R.F.D. 4, Box 1478, 24th St. Road, Sacramento	Sacramento
Sacramento Brick Co.	b	1400 Front St., Sacramento	Sacramento
Valley Brick Co.	b	Box 1180, Sacramento	Sacramento
<i>San Benito County</i>			
D. L. Stewart Property, A. P. Stewart, Lessee	c	1052 Vermont, San Jose	Tres Pinos
<i>San Bernardino County</i>			
Hancock Brick Yard, C. P. Hancock & Son	b	4330 Lemon St., Riverside	Highgrove
Hart Clay Co., W. K. Skeoch, Lessor	c	2022 Thayer Ave., Los Angeles	Goffs
Kennedy Clay Pit, John Kennedy	c	1306 3/4 Warren Ave., Los Angeles	Daggett
National Lead Co., Pigments & Chemical Div.	c	983 Wilson, Los Angeles	Hector
Pacific Coast Talc Co.	c	2149 Bay St., Los Angeles	Silver Lake
Standard Sanitary Mfg. Co., Pacific Mines, P. R. Jones, Mgr.	c	Campo	Hurt
J. H. Stone	c	Barstow	Barstow
Temescal Clay Co.	g	5601 S. Boyle Ave., Vernon	Hicks
Hollie H. Thew	c	515 4th St., San Bernardino	Hector
Velvet-White Mines, B. Driscoll	c	4721 Second Ave., Los Angeles	Oro Grande
<i>San Diego County</i>			
Pacific Clay Products Co.	c	Box 145, Station A, Los Angeles	Farr Station
Union Brick Co., J. W. Rice	b	3565 3d St., North San Diego	Rose Canyon
Vitrified Products Corp.	a, b, c	2841 Jefferson St., North San Diego	North San Diego

<i>San Joaquin County</i> San Joaquin Brick Co., J. F. Stein, Secy.	b	33 S. El Dorado St., Stockton	Stockton
<i>San Luis Obispo County</i> Antelope Mud Co., W. G. Angus, Mgr. San Luis Brick Works, Faulstich Bros.	d b, d	Box 204, Lost Hills San Luis Obispo	Cholame San Luis Obispo
<i>San Mateo County</i> Richmond Potteries, Inc.	a	Box 187, South San Francisco	South San Francisco
<i>Santa Barbara County</i> Parker Brick Co., J. V. Parker	a, b	303 Ladera St., Santa Barbara	Santa Barbara
<i>Santa Clara County</i> Coyote Creek Clay Beds, L. R. Lenfest Garden City Pottery Gladding Bros. Mfg. Co. Hlandcraft Tile Co., L. W. Austin et al. Renillard Brick Co. San Jose Brick Co. S. & S. Tile Co.	c a a, b, c a b c a	1195 E. Santa Clara St., San Jose 560 N. 6th St., San Jose S. 3d and Keyes Sts., San Jose R.F.D. 2, Box 121A, San Jose 569 3d St., Oakland Box 274, San Jose 1881 S. 1st St., San Jose	San Jose San Jose San Jose San Jose San Jose San Jose
<i>Sonoma County</i> Beltane Clay Deposit, Harry Weise	c	Glen Ellen	Beltane
<i>Stanislaus County</i> Coopertown Clay Deposit, J. H. Hornsby V. J. Winkler	c c	651 Cumberland St., Pittsburg Knights Ferry	Coopertown Knights Ferry
<i>Sutter County</i> Gladding, McBean & Co.	c	2901 Los Feliz Blvd., Los Angeles	Nicolaus
<i>Tulare County</i> San Joaquin Materials Co.	b	744 G St., Fresno	Exeter
<i>Ventura County</i> Peoples Lumber Co., C. E. Bonestel, Mgr. Shell Oil Co., Dent Clay Pit	a, b, c d	N. Ventura Ave., Ventura Shell Bldg., San Francisco	Ventura Ventura

\* Plant destroyed by fire.

a. Clay products. b. Brick and hollow building tile. c. Crude clay. d. Oil-well drilling-mud. e. Filtering clay. f. Fire sand. g. Ganister.

## COAL

Operator	Remarks	Address	Location of mine
<i>Amador County</i> Buena Vista Coal Mining Co., J. J. Morras, Supt.			Buena Vista
<i>San Benito County</i> Masceovich Coal Mine		Ione, c/o R.F.D.	San Benito
<i>Trinity County</i> Tom Reese		R.F.D. 1, Box 81, Salinas Douglas City	Douglas City

## COPPER

*Principal Copper Producers in California in 1936*

Mine	Operator	Address	Location of mine
<i>Inyo County</i> Santa Rosa	Santa Rosa Mines Dev. Co., G. W. Dow, Trustee	Keeler	Keeler
<i>Nevada County</i> Lava Cap San Juan Spanish	Lava Cap Gold Mining Co. Bradley Mining Co. Bradley Mining Co.	Box 780, Nevada City Crocker Bldg., San Francisco Crocker Bldg., San Francisco	Nevada City North San Juan Washington
<i>Plumas County</i> Walker	Walker Mining Co.	821 Kearns Bldg., Salt Lake City, Utah	Walker Mine

## DIATOMITE (DIATOMACEOUS EARTH)

Operator	Address	Location of quarry or mine
<i>Los Angeles County</i> The Dicalite Co. Raylite Aggregates, Inc.	756 S. Broadway, Los Angeles 1302 Park Central Bldg., Los Angeles	San Pedro Palos Verdes
<i>Monterey County</i> Pacatome, Ltd.	Bradley	Bradley
<i>Santa Barbara County</i> Johns-Manville Products Corp. Lompoc Mining Products, Inc., C. E. Miller The Paraffine Co., Inc.	Lompoc 1201 Bryant St., Palo Alto Ft. of Powell St., Emeryville	Lompoc Lompoc Lompoc



## DOLOMITE

Operator	Address	Location of quarry
<i>Inyo County</i> Inyo Marble Co.	726-732 E. 29th St., Los Angeles	Keeler
<i>Monterey County</i> Pacific Coast Steel Corp., Sterling Ranch Quarry	20th and Illinois Sts., San Francisco	Natividad

## FELDSPAR

Operator	Address	Location of mine
<i>Fresno County</i> Industrial Minerals & Chemical Co.	836 Gilman St., Berkeley	Priant
<i>San Diego County</i> Ames Grinding Co., Geo. Ames Chamberlain Co., Inc. Standard Sanitary Mfg. Co., P. R. Jones, Mgr.	2030 E. 52d St., Los Angeles 2550 E. 9th St., Los Angeles Campo	Jacumba Campo

## GEMS

Operator	Variety	Address
C. M. Carter	Topaz, garnets, hyacinth	Youngs P.O., El Dorado County
C. E. Cline	Jasper, agate, opal	1594 Waterman Ave., San Bernardino
Death Valley Gem Shop, Glen Gardner	Orbicular and brecciated jasper	312 12th St., Oakland
W. C. Eyles	Orbicular and brecciated jasper and prase opal	36 Fountain St., San Francisco
Robert J. Graham	Iridescent obsidian	Davis Creek
H. F. Heather	Iceland-spar	236 Oak Knoll Ave., Pasadena
Howard Small	Agate, jasper	311 Main St., Riverside
Donald Wright	Iridescent obsidian	Cayucos

## \* GOLD

Principal Gold Producers in California out of a Total of 2,599 Placer Operators and Lode Mines in 1936

Mine	Type of mine	Operator	Address	Location of mine
<i>Amador County</i>				
Argonaut	a	Argonaut Mining Co., Ltd.	1404 Humboldt Bank Bldg., San Francisco	Jackson
Arroyo Seco	c	Arroyo Seco Gold Dredging Co.	351 California St., San Francisco	Ione
Black Hills	a	Black Hills Mining Co.	Jackson	Jackson
Buena Vista	g	Lancha Plana Hydraulic Mine	Box 27, Ione	Buena Vista
Central Eureka & Old Eureka	a	Central Eureka Mining Co.	111 Sutter St., San Francisco	Sutter Creek
Central Eureka Dump	c	Central Tailings Co.	564 Market St., San Francisco	Sutter Creek
Delta Tailings Dump	c	Delta Tailings Co.	564 Market St., San Francisco	Ione
Fort Ann	a	J. C. Nimmo & P. W. Kent	Volcano	Volcano
Fuller	a	John J. Bernich & G. F. Fuller	Jackson	Jackson
Kennedy	a	Kennedy Mining & Milling Co.	519 California St., San Francisco	Martell
McCullough Tailings	c	Ernest G. Rurup	2567 38th Ave., Oakland	
Original Amador	a	Original Amador Gold Mines	Amador City	Amador City
Peterson (Levezzo)	a	W. F. Petersen	Jackson	Jackson
Pioneer Lucky Strike	a	Anazira Mining Co.	Pine Grove	Pine Grove
Red Hill	h	A. C. McMillan & L. L. Neal	700 Mills Bldg., San Francisco	Sutter Creek
Valpariso	a	Valpariso Mining Co.	Jackson	Jackson
<i>Butte County</i>				
Briggs	c	Yuba Consolidated Gold Fields	351 California St., San Francisco	Rio Bonito
Dageritt Land	h	Cinco Mineros Co.	Box 212, Oroville	Wyandotte
Consuelo	k	Max Hoffman	Oroville	Oroville
Drescher, Ford, &				
Wheeler Properties	h	Honeut Dredging Co., Geo. F. Jones	2052 Bird St., Oroville	Oroville
Granchella Ranch	h	Penn Dredging Co., A. B. Innis	1620 Bird St., Oroville	Oroville
Hintz	k	C. H. Hintz & Clarence Young	Chico	Big Butte Creek
Lava Cap	f	George L. Albert	Chico	Magalia
Midas	a	Idaho Maryland Mines Corp.	Russ Bldg., San Francisco	Forbestown
Richter & Sons Gold Dredge	h	Wm. Richter	R.F.D. 2, Box 318, Oroville	Oroville
Riley Estate	h	Western Dredging Co.	Oroville	Oroville
Ross Sands Orchard, Bernhard Ranch, Kehriotis Ranch	h	Butte Gold Dredging Co.	Oroville	Oroville
Springer	a	Springer Consolidated Mines, C. A. Smith	Oroville	Oroville
Sureuse	a	Hoefting Bros.	De Sabla	De Sabla
Truman Hill	c	Oroville Gold Dredging Co.	1000 4th St., Sacramento	Yankee Hill
Wyandotte Creek	h	Wyandotte Gold Dredging Co., H. J. England, Mgr.	Oroville	Oroville
<i>Calaveras County</i>				
Calaveras	a	Mar John Mines Co., P. B. Russell, Sup't.	Sheepranch	Sheepranch
Calaveras Central	f	Calaveras Central Gold Mining Co., Harry Sears	806 Hobart Bldg., San Francisco	Angels Camp
Cananche Placers	c	Cananche Placers, Ltd.	Cananche	Cananche

Clear Creek & South Gulch	h	Milton Gold Dredging Enterprise, K. G. Schwager	405 Montgomery St., San Francisco	Milton
Carson Hill	a	Carson Hill Gold Mining Corp.	Sonora	Melones
Easy Bird	a	Lucky Joe Gold Mining Co.	Box 292, Jackson	San Andreas
Esmond and James Properties	e	Wallace Dredging Co.	311 California St., San Francisco	Wallace
Fine Gold	a	Fine Gold Mining Co., Horace N. Taylor, Pres.		
Foster Ranch	e	Camanche Gold Dredging Co.	5007 Franklin Ave., Los Angeles	Railroad Flat
Gilbousen	h	Atlas Gold Dredging Corp.	311 California St., San Francisco	Camanche
Golden River (Bishop)	f	Golden River Mining Corp.	617 Edison Bldg., Los Angeles	Wallace
Gold-Gravel	k	Gold-Gravel Products, Inc.	649 S. Olive St., Los Angeles	Angels Camp
Grand Army	a	H. G. Gobelman	Box 113, Berkeley	Wallace
Lancha Plana	e	Lancha Plana Gold Dredging Co.	Mokelumne Hill	Mokelumne Hill
Lloyd	f	G. F. Sheckler	621 W. Acassia St., Stockton	Camanche
McKisson	a	Consolidated Mines of California	634 S. Spring St., Los Angeles	San Andreas
Oro y Plata	a	Orion Mining Co.	1022 Crocker Bldg., San Francisco	Mokelumne Hill
Royal	a	Frank S. Tower	Milton	Murphys
South Gulch	h	E. L. Lilly	California Bldg., Stockton	Milton
Vallecito Western	f	Tonopah Belmont Dev. Co.	501 Bullitt Bldg., Philadelphia, Pa.	Camanche
				Angels Camp
<i>El Dorado County</i>				
Beebe-Alpine	a	Beebe Gold Mining Co.	Crocker Bldg., San Francisco	Georgetown
Big Canyon	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Shingle
Black Oak	a	Russell J. Wilson	Garden Valley	Garden Valley
Boulder	k	Pilot Hill Mining Co., Fay Gibson	Box H, Auburn	Pilot Hill
Briarcliffe	a	Briarcliffe Mines, Ltd.	Box 156, Plymouth	Plymouth
Carpender	f	Placeres de Oro Co.	Box 215, Placerville	Placerville
Gold Reserve	a	George W. Pelner	c/o Bank of America, 8th and J Sts., Sacramento	Placerville
Lotus	k	R. A. Healy	Lotus	Lotus
Kelsey	a	Kelsey Mining Co., Inc.	519 California St., San Francisco	Placerville
Montezuma & Union	a	Montezuma-Apex Mining Co.	Box M, Placerville	Placerville
Sliger	a	Middle Fork Gold Mining Co.	Box M, Auburn	Greenwood
Verkamp Ranch	a	Gold Company, Ltd.	Garden Valley	Garden Valley
<i>Humboldt County</i>				
Pearch	g	Roy McGain	Orleans	Orleans
<i>Imperial County</i>				
Sovereign Group	a	Sovereign Development Co.	30 Bay State Road, Boston, Mass.	Ogilby
Tumeco Tailings	c	Riggs & Horgan	Ogilby	Ogilby
<i>Inyo County</i>				
American Eagle	a	F. N. Banta	Inyokern	Inyokern
Cardinal	a	Cardinal Gold Mining Co.	Bin D, Bishop	Bishop Creek
Cleveland	a	T. L. Bright	Big Pine	Big Pine
Monte Carlo	a	Monte Carlo Mines Co.	Box 236, Lone Pine	Lone Pine
Morning Star	a	Keeler Gold Mines, Inc.	972 4th Ave., Los Angeles	Keeler
Orondo	f	Orondo Mines, L. C. Rosefelt	1028 Wall St., Los Angeles	Argus Mountain
Silver Ball (Skidoo)	a	W. B. Gray	Beatty, Nev.	Lone Pine

a. Lode gold mine. b. Placer (sticking) mines. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. i. Power shovel. j. Copper-gold mine. l. Silver-gold mine.

a. Lode gold mine. b. Placer (stirring) mines. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. k. Power shovel. i. Copper-gold mine. l. Silver-gold mine.



## GOLD—Continued

## Principal Gold Producers in California out of a Total of 2,599 Placer Operators and Lode Mines in 1936

Mine	Type of mine	Operator	Address	Location of mine
<i>Kern County</i>				
Big Blue.....	a	Kern Mines, Inc.....	605 Market St., San Francisco.....	Kernville
Big Butte.....	a	Butte Lode Mining Co.....	1231 Roosevelt Bldg., Los Angeles.....	Mojave
Big Dike.....	a	Shea, Benko & Miller.....	Randsburg.....	Randsburg
Buckboard.....	a	E. P. Ferry & Paul E. Nelson.....	Randsburg.....	Randsburg
Echo.....	a	Jack Sweetser.....	Box 393, Mojave.....	Mojave
Elephant & Starlight.....	a	Lodestar Mining Co.....	Box 235, Mojave.....	Mojave
Fairview.....	a	Henry Kelsey & Burton.....	Rosamond.....	Rosamond
Golden Queen.....	a	Golden Queen Mining Co.....	Mojave.....	Mojave
Lake View.....	a	Yellow Dog Mining Co.....	Mojave.....	Mojave
Middle Butte.....	a	Middle Butte Mines, Inc.....	Rosamond.....	Rosamond
Soledad Extension.....	a	Soledad Mojave Mining Syndicate.....	1200 Rives-Strong Bldg., Los Angeles.....	Mojave
Tropico.....	a	Burton Bros., Inc.....	Rosamond.....	Rosamond
Whitmore.....	a	Whitmore Mines, Inc.....	Rosamond.....	Rosamond
Yellow Aster.....	a	Anglo American Mining Corp.....	Mills Bldg., San Francisco.....	Randsburg
<i>Lassen County</i>				
Juniper & Golden Eagle.....	a	Hayden Hill Gold Corp.....	Symons Bldg., Spokane, Wash.....	Adin
<i>Los Angeles County</i>				
Allison.....	a	V. F. Kirchhoff.....	151 N. Florence St., Burbank.....	Azusa
Governor.....	a	Governor Mining Co.....	725 S. Figueroa, Los Angeles.....	Acton
Suzanna & Valvue.....	a	Rogers & Gentry.....	Fairmont.....	Fairmont
<i>Mariposa County</i>				
Champion.....	a	Carda Mining Co.....	Box 54, Coulterville.....	Coulterville
Diltz.....	a	E. R. Baker et al.....	1518 14th St., Sacramento.....	Whitlock
Golden Key.....	a	Golden Key Mining Co.....	Box 167, Mariposa.....	Whitlock
Kumle & Ferris.....	h	Placer Properties Co., Inc., Kumle & Ferris.....	Box 96, Le Grand.....	Le Grand
Mt. Gaines.....	a	Mt. Gaines Mining Co., A. G. Hseng.....	183 N. Martel Ave., Los Angeles.....	Hornitos
Original & Ferguson.....	a	San Juan Ramsey Co.....	Box 30, Incline.....	Incline
Ortiz.....	a	John Q. Finfroek.....	Box 108, Mariposa.....	Mariposa
Pine Tree, Josephine & French.....	a	Pacific Mining Co.....	Crocker Bldg., San Francisco.....	Bear Valley
Pyramid.....	a	Pyramid Gold, Inc.....	Grant Bldg., San Jose.....	Hornitos
Ruth Pierce Tailings.....	c	Ernest L. Buerki.....	Hornitos.....	Hornitos
Schroeder.....	a	Golden Empire Mining Co., A. C. Pehrson.....	1205 Colusa Ave., Berkeley.....	Midpines
<i>Merced County</i>				
Merced.....	c	Merced Dredging Co.....	Mills Tower, San Francisco.....	La Grange
Merced Unit.....	c	Yuba Consolidated Gold Fields.....	351 California St., San Francisco.....	Snelling
Snelling.....	c	Snelling Gold Dredging Co.....	Snelling.....	Snelling



## GOLD—Continued

## Principal Gold Producers in California out of a Total of 2,599 Placer Operators and Lode Mines in 1936

Mine	Type of mine	Operator	Address	Location of mine
<i>Plumas County</i>				
Five Bears	a	Five Bears Mining Co., Everett W. Ball	1105 Guaranty Bldg., Los Angeles	Quincy
Indian Valley & New York	a	Haunton Engineering Co.	351 California St., San Francisco	Greenville
Mary Ann	d	Vernillion Mining Co.	365 N. Parkman Ave., Los Angeles	La Porte
Robinson	a	Graunite Basin Mining Co.	Berry Creek	Berry Creek
Standart	a	Indian Valley Mining Co., Inc.	1210 Western Ave., Seattle, Wash.	Greenville
Virginia	a	Virginia Mining Corp.	Virginia	Virginia
Walker	j	Walker Mining Co.	821 Kearns Bldg., Salt Lake City, Utah	Walker mine
<i>Riverside County</i>				
Golden Bee	a	Horace W. Campbell et al.	Twentynine Palms	Twentynine Palms
Gold Crown & Nightingale	a	Gold Crown Mining Co., Ltd.	730 Petroleum Securities Bldg., Los Angeles	Twentynine Palms
Red Cloud	a	S & W Mine Development Co., B. F. Schmidt	2250 Crenshaw Blvd., Los Angeles	Mecca
<i>Sacramento County</i>				
Biggs Ranch	c	Sacramento Gold Dredging Co.	351 California St., San Francisco	Biggs Ranch
Capital	c	Capital Dredging Co.	351 California St., San Francisco	Folsom
Cosumnes	c	Cosumnes Gold Dredging Co.	351 California St., San Francisco	Slough House
Gold Hill	c	Gold Hill Dredging Co.	311 California St., San Francisco	Folsom
Gray Wing	f	Gray Wing Extension Mining Co.	1014 1st St., Napa	Folsom
Mississippi Bar	h	A. V. & K. K. Bechtel	155 Sansome St., San Francisco	Folsom
Natomas	c	Natomas Co.	Box 1197, Sacramento	Natoma
<i>San Bernardino County</i>				
Coin Consumers	a	Frank I. Jaynes	Box 33, Highway Highlands	Randsburg
Kelly	l	Kelly Gold & Silver Mines, Inc., Frank W. Roper	606 Hill St., Los Angeles	Randsburg
Telegraph	a	Solo Engineering Co., C. F. Robbins	132 Pine Ave., Long Beach	Nipton
<i>Shasta County</i>				
Casad Ranch	h	L. H. Kryer et al.	Redding	Redding
China Gulch	h	Roy S. Olson	1517 Riverside Dr., Redding	Redding
Clear Creek Placers	h	R. E. Anderson	600 3d St., Marysville	Redding
Dry Creek	h	Midland Co.	733 Dwight Way, Berkeley	Cottonwood
Gold Acres Estate	h	Palermo Dredging Co.	Cottonwood	Cottonwood
Iron Mountain	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Matheson
Olney Creek	h	Golden State Dredging Co.	Redding	Redding
Pioneer	h	Pioneer Dredging Co.	Box 700, Redding	Cottonwood
Walker	a	Dowling Mining & Investment Co.	2920 Cass Ave., St. Louis, Mo.	Redding







## GOLD—Continued

Principal Gold Producers in California out of a Total of 2,599 Placer Operators and Lode Mines in 1936

Mine	Type of mine	Operator	Address	Location of mine
<i>Tuolumne County</i>				
Columbus	a	Columbus Gold Mining Co.	1 Montgomery St., San Francisco	Tuolumne
Contention	a	Kappel Mining Co.	Sonora	Sonora
Experimental	a	Shoe String Mining Co.	Box 176, Columbia	Columbia
Erin-Go-Bragh	a	California Standard Gold Mines Corp.	Jamestown	Jamestown
Heslep	a	Gold Diggers Syndicate	Jamestown	Jamestown
Little Bonanza	d	Alfred Barlow & Jack Lawson	Sonora	Sonora
Menke-Hess	k	Menke-Hess Gravels, Inc.	Oakdale	Chinese Camp
Soulsby-Belle	a	Soulsby Belle Mining Co.	Soulsbyville	Soulsbyville
Springfield	f	Calaveras Land Co.	Columbia	Columbia
<i>Yuba County</i>				
Blue Point	f	Gold Exploration Mining Co.	Smartville	Smartville
Mt. De Oro	a	Clayton T. McNeil	Woodleaf	Woodleaf
Yuba	c	Yuba Consolidated Gold Fields	351 California St., San Francisco	Hammonton

a. Lode gold mine. b. Placer (sluicing) mines. c. Tailings dumps. d. Pocket. e. Dredge (bucket line). f. Drift mine. g. Hydraulic mine. h. Dragline dredge. k. Power shovel. j. Copper-gold mine. l. Silver-gold mine.

## GRANITE

Operator	Product	Address	Location of quarry
<i>Fresno County</i> Academy Granite Superior Granite Co., Inc.	a a	Clovis Clovis	Clovis Academy
<i>Lassen County</i> A. D. Greig, Greig Quarry	a	Susanville	Susanville
<i>Los Angeles County</i> Binder Bros., W. H. Binder	d	285 N. Lake Ave., Pasadena	Boquet Canyon
<i>Madera County</i> Kingsland Granite Co. McGilvray Raymond Corp.	a a	Box 156, Madera 3 Potrero Ave., San Francisco	Bates Station Raymond
<i>Mariposa County</i> Yosemite National Park	a	Yosemite	Yosemite Park
<i>Nevada County</i> Netz Granite Quarry, Ludwig Netz	a	Nevada City	Nevada City
<i>Placer County</i> Union Granite Co., Mat Ruhkala Victor Wickman	a a	Rocklin Rocklin	Rocklin Rocklin
<i>San Diego County</i> American Marble & Granite Works Crystal Black Quarry, John Stridsburg Matson & Deering, Meyers Quarry Pacific Cut Stone & Granite Co. Southern Cal. Granite Co.	a a a a a	1212 E. Olympic Blvd., Los Angeles Escondido Lakeside 414 S. Marengo Ave., Alhambra 3845 Imperial St., San Diego	Santee Spooks Canyon Lakeside Escondido Lakeside
<i>Sonoma County</i> S. Cabrol L. R. De Chesne Ernest Laurent	b, c c b, c	Glen Ellen Glen Ellen Kenwood	Glen Ellen Glen Ellen Kenwood
<i>Tulare County</i> Sequoia Nat'l Park	a, d	Three Rivers	Sequoia Nat'l Park

a. Granite used in building and monumental stone. b. Tuff used as building stone. c. Volcanic rock used as flagstone. d. Mica schist used as building stone.

## GYPSUM

Operator	Address	Location of quarry
<i>Fresno County</i> Dos Palos Gypsum Co., O. L. Divens and A. A. Conrowe Green & Collins Paoli Gypsum Mine, A. P. Shepard, Mgr.	Dos Palos Ceres 3101 Mariposa St., Fresno	Dos Palos South Dos Palos Mendota
<i>Imperial County</i> Imperial Gypsum Quarry, Pacific Portland Cement	111 Sutter St., San Francisco	Plaster City
<i>Kern County</i> Koehn Gypsum Plant, Jennie E. Daly	Cantil	Saltlake
<i>Riverside County</i> U. S. Gypsum Co.	507 Architects Bldg., Los Angeles	Midland

## IODINE

Operator	Address	Mine
<i>Los Angeles County</i> Deepwater Chemical Co., Ltd. I. O. Dow Chemical Co.	Box 588, Compton 310 Santiago Ave., Long Beach	Compton Long Beach

## IRON

Mine	Operator	Address	Location of mine
<i>San Bernardino County</i> Cave Canyon	A. S. Vinell Co.	969 Amelia Ave., Los Angeles	Baxter
<i>Santa Cruz County</i> Rob Roy Beach	Coast Metals & Reduction Co.	Rob-Roy via Watsonville	Rob Roy



## LEAD

## Principal Lead Producers in California in 1936

Mine	Operator	Address	Location of mine
<i>Inyo County</i>			
Bunker Hill	Bunker Hill Mining Co.	Big Pine	Big Pine
Copper Claim	Gold Button Mines, Inc.	Box 1556, Bakersfield	Trona
Estell & Cerro Gordo	Estell Mines Corp.	972 S. 4th Ave., Los Angeles	Keeler
Golden Circle	H. L. Schueter & W. R. Frieder	Beatty, Nev.	Chloride Cliff
Madison	J. B. Madison	Trona	Trona
Monte Carlo	Monte Carlo Mines Co.	Box 236, Lone Pine	Lone Pine
Santa Rosa	Santa Rosa Mines Dev. Co., G. W. Dow, Trustee	Keeler	Keeler
<i>Mono County</i>			
Antimony	Earl Oxborrow	Topaz	Topaz
<i>Nevada County</i>			
Empire North Star	Empire Star Mines Co., Inc.	14 Wall St., Rm. 1507, New York	Grass Valley
Empress	Republic Gold Mining Co.	224 Tower Bldg., Santa Monica	Grass Valley
Lava Cap	Lava Cap Gold Mining Corp.	Box 780, Nevada City	Nevada City
Spanish	Bradley Mining Co.	Crocker Bldg., San Francisco	Washington
<i>Orange County</i>			
Blue Light	O. H. Pembrer	Silverado	Silverado
<i>San Bernardino County</i>			
Carbinato	P. F. Hillwig	Oro Grande	Oro Grande
	C. O. Hewins	Pine Knot	Baker

## LIME AND LIMESTONE

Operator	Product	Address	Location of quarry
<i>Alameda County</i> California Chemical Co.	a, d, e	Mills Tower, San Francisco	Newark
<i>El Dorado County</i> Auburn Chemical Lime Co., Ltd. Diamond Springs Lime Co. El Dorado Limestone Co., J. H. Bell, Pres. Pac. Portland Cement Co., Cons.	a, b a, b b, e b	Auburn Diamond Springs Shingle Springs 111 Sutter St., San Francisco	Newcastle Diamond Springs Shingle Springs Auburn
<i>Fresno County</i> Coral Reef Lime Corp., B. F. Mason, Mgr. Drake Lime Co., H. E. Drake	e, e e, e	Dinuba R.F.D. 2, Box 821, Sanger	Reedley Sanger
<i>Los Angeles County</i> W. F. Glasser, Inc.	b	713 N. Sepulveda, Brentwood Heights, Los Angeles	
<i>San Bernardino County</i> Cal. Portland Cement Co. Chubbuck Lime Co., Chas. I. Chubbuck Pacific Coast Tale Co. Victorville Lime Rock Co.	a a, b, e b b	601 W. 5th St., Los Angeles 500 Worth St., Los Angeles 2149 Bay St., Los Angeles 2424 Enterprise St., Los Angeles	Colton Chubbuck Silver Lake Victorville
<i>San Luis Obispo County</i> Charles Taylor	b	Salinas	Cambria
<i>San Mateo County</i> Pacific Portland Cement Co.	e, d	111 Sutter St., San Francisco	San Mateo
<i>Santa Clara County</i> Bay Shell Co. L. H. Beck W. B. Ortle Shell Co.	e, d e, d d	503 Market St., San Francisco Box 113, Colma Alviso	Alviso Alviso Alviso
<i>Santa Cruz County</i> Basic Limestone Products Co. Henry Cowell Lime and Cement Co., W. H. George, Mgr. Pacific Limestone Prod. Co.	a, b a, b b	625 Market St., San Francisco 2 Market St., San Francisco Spring St., Santa Cruz	Santa Cruz Santa Cruz
<i>Tuolumne County</i> McLean Quarry, W. S. McLean U. S. Lime Products Corp.	a a, b	419 Bayshore Blvd., San Francisco 58 Sutter St., San Francisco	McLean Spur Sonora

a. Producer of burnt lime. b. Producer of limestone. c. Agricultural lime. d. Shells. e. Marl.

## MAGNESITE

Operator	Address	Location of mine
<i>Santa Clara County</i> California Chemical Co., Lessee, Western Magnesite Mine-----	Mills Tower, San Francisco.-----	Red Mountain
<i>Stanislaus County</i> California Chemical Co., Bald Eagle Mine-----	Mills Tower, San Francisco.-----	Gustine

## MAGNESIUM SALTS

Operator	Product	Address	Location of plant
<i>San Diego County</i> California Chemical Co.-----	Chloride	Mills Tower, San Francisco.-----	San Diego
<i>San Mateo County</i> Marine Chemical Co., R. E. Clarke. Plant Rubber & Asbestos Works.-----	Carbonate Carbonate	South San Francisco. 537 Brannan St., San Francisco.-----	South San Francisco Redwood City

## MARBLE (Including Onyx and Travertine)

Operator	Product	Address	Location of quarry
<i>Inyo County</i> Death Valley Gem Shop, Glen Garduer.....	c	312 12th St., Oakland.....	Death Valley
<i>Los Angeles County</i> W. F. Glasser, Inc.....	b	713 N. Sepulveda, Los Angeles.....	Brentwood Heights
<i>San Bernardino County</i> Onyx Mine, John Olsen & Pete Logan.....	c	Whitewater.....	
Howard Small.....	c	311 Main St., Riverside.....	
<i>San Luis Obispo County</i> Renolds Quarry, Thomas C. Renolds.....	b	Box 53, Paso Robles.....	Paso Robles
<i>Santa Barbara County</i> G. Antolini.....	b	111 E. Gutierrez St., Santa Barbara.....	Tijguas
<i>Solano County</i> P. Grassi & Co.....	c	1945 San Bruno Ave., San Francisco.....	Cement
Tolenas Springs Onyx, L. Cardini.....	c	121 14th St., San Francisco.....	Tolenas
<i>Tuolumne County</i> Columbia Marble Co.....	a	Columbia, Tuolumne County.....	Columbia

a. Marble. b. Limestone, building and flagstone. c. Onyx and travertine.

## MICA

Operator	Variety	Address	Location of property
<i>Imperial County</i> Mica Talc Co., Inc.....	Mica schist	2808 S. Pacific Blvd., San Pedro.....	Ogilby
<i>Kern County</i> Western Borax Co.....	Sericite	417 S. Hill St., Los Angeles.....	Randsburg
<i>Riverside County</i> J. I. Fassett.....	Vermiculite	Box 921, Palm Springs.....	Indio



## MINERAL PAINT

Operator	Address	Location of property
<i>Placer County</i> Synthetic Iron Color Co.....	Richmond.....	Forest Hill

## MINERAL WATER

Oerator	Address	Location of spring
<i>Butte County</i> Feather River Canyon Spring Water Co., R. E. Chappell..... Richardson Springs, Lee Richardson, Mgr.....	2215 L St., Sacramento..... Chico.....	Pulga Chico
<i>Calaveras County</i> Mok-Hill Mineral Springs, L. Walkmeister.....	Sutter Creek.....	Sutter Creek
<i>Colusa County</i> Cooks Springs, D. D. Markham.....	Lodoga.....	Cooks Springs <sup>s</sup>
<i>Contra Costa County</i> Alhambra Water Co.....	Martinez.....	Martinez
<i>El Dorado County</i> Digger Indian Natural Medicine Water Co.....	Randall P.O.....	Randall
<i>Lake County</i> Adams Mineral Springs, Clarence Prather..... Bartlett Spring Co..... Norman Mineral Springs, H. C. Norman, Mgr..... Witter Medical Springs, W. E. Whitaker.....	Adams, via Middletown..... 681 Geary St., San Francisco..... Middletown..... 995 Market St., San Francisco.....	Adams Bartlett Springs Middletown Witter Springs
<i>Los Angeles County</i> Cascade Water Co..... Deep Rock Artesian Water..... Elysian Spring Water Co..... Frespuero Artesian Water..... Holly Spring Water..... Magnetic Spring Water Co..... Mission Spring Water Co..... Mountain Spring Water Co..... Pure-lax Mineral Water Co..... Sparklett Bottled Water Co..... Tarzana Mineral Water Co.....	4556 York Blvd., Los Angeles..... 4416 York Blvd., Los Angeles..... 1536 Baxter, Los Angeles..... 4430 York Bldg., Los Angeles..... 2298 Holly Dr., Los Angeles..... 936 Palm Ave., Sherman..... 8938 Keith, Hollywood..... 226 S. Avenue 54, Los Angeles..... 3640 Griffin, Los Angeles..... 4500 York Blvd., Los Angeles..... 1485 N. Vine, Los Angeles.....	Los Angeles Los Angeles Los Angeles Los Angeles Los Angeles Los Angeles Hollywood Los Angeles Los Angeles Los Angeles Los Angeles

## MINERAL WATER—Continued

Operator	Address	Location of spring
<i>Maria County</i> Purity Spring Water Co.	2032 Kearny St., San Francisco.	
<i>Napa County</i> Calistoga Bottling Works, E. E. Hardies Napa Soda Springs Co., G. H. T. Jackson Napa Vichy Springs, V. Frugoli Sannuels Soda Springs, Mrs. Robert J. Little.	Calistoga 315 Montgomery St., San Francisco. 225 Bay St., San Francisco. Monticello.	Calistoga Napa Napa Monticello
<i>Orange County</i> La Vida Mineral Springs Co.	R. F. D. 1, Placentia.	Carbon Canyon
<i>Placer County</i> Ki-ta-ga Co.	Lincoln.	Valley
<i>Riverside County</i> Beulah Springs, Oscar C. McNicholl.	Arlington.	Arlington
<i>San Bernardino County</i> Arrowhead Hot Springs, Calif. Cons. Water Co.	1566 E. Washington Blvd., Los Angeles.	Arrowhead
<i>San Diego County</i> Cuyamaca Mineral Water, Cuyamaca Distilled Water Co. Rock Springs Co., E. S. Walek.	67 8th St., San Diego. R. F. D. 2, box 442, Escondido.	San Diego Escondido
<i>San Francisco County</i> Blue Crest Beverage Co., Morris & Paul Greenberg Diamond Rock Spring Water Co., L. Paulinelli	265 Naples, San Francisco. 247 Naples St., San Francisco.	San Francisco San Francisco
<i>San Luis Obispo</i> Crystal Spring Water Co., W. R. Hudson Superior Spring Water Co.	R. F. D. 2, Box 11, San Luis Obispo. c/o Sandercock Trans. Co., San Luis Obispo.	San Luis Obispo San Luis Obispo
<i>Santa Barbara County</i> Veronica Minera, Springs Co.	699 Brannan St., San Francisco.	Santa Barbara
<i>Siskiyou County</i> The Shasta Water Co. Yreka Coco Cola Bottling Works, Fred J. Meunier, Prop.	6th and Brannan Sts., San Francisco. Yreka.	Dunsmuir Little Shasta
<i>Sonoma County</i> Agua Caliente Springs Co., T. H. Corcoran, Prop. Boreal Springs, John Kolling Boyces Springs Mineral Water Co. Fetters Mineral Springs, George Fetters	Agua Caliente. Preston. Boyces Springs. Fetters Springs.	Agua Caliente Preston Boyces Springs Fetters Springs

## PLATINUM

*Principal Platinum Producers in California in 1936*

Operator	Address	Location of mine
<i>Calaveras County</i> Comanche Gold Dredging Co.....	311 California St., San Francisco.....	Comanche
<i>Merced County</i> Merced Dredging Co..... Yuba Consolidated Gold Fields.....	Mills Bldg., San Francisco..... 351 California St., San Francisco.....	Snelling Snelling
<i>Sacramento County</i> Capital Dredging Co..... Natomas Co.....	Balfour Bldg., San Francisco..... Forum Bldg., Sacramento.....	Folsom Natomas
<i>Stanislaus County</i> La Grange Gold Dredging Co.....	Mills Bldg., San Francisco.....	La Grange
<i>Trinity County</i> Hayfork Dredging Co..... Junction City Mining Co.....	Hayfork..... Junction City.....	Hayfork Junction City
<i>Yuba County</i> Yuba Consolidated Gold Fields.....	351 California St., San Francisco.....	Hammonton

## POTASH

Operator	Address	Location of plant
<i>San Bernardino County</i> American Potash and Chemical Co.....	Trona.....	Trona

## PUMICE OR VOLCANIC ASH

Operator	Product	Address	Location of quarry
<i>Imperial County</i> Chamberlain Co., Inc.	a	2550 E. 9th St., Los Angeles	Calipatria
<i>Inyo County</i> Chas. Brown	a	Shoshone	Shoshone
Little Lake Pumice Co.	a	1204 S. Monterey St., Alhambra	Coso Junction
Tonopah & Tidewater Ry.	b	1014 Central Bldg., Los Angeles	Shoshone
<i>Kern County</i> Cudahy Packing Co.	b	803 Macy St., Los Angeles	Cereda
<i>Madera County</i> Friant Pumice Co., Earl R. Carper	b	816 Pacific Southwest Bldg., Fresno	Friant
<i>Mono County</i> California Quarries Corp.	a	1300 Quinby Bldg., Los Angeles	Laws
<i>Napa County</i> Pearl Pumice Quarries, Jas. H. Pearl	a	565 Monticello Rd., Napa	Monticello
Soule Steel Co.	a	1750 Army St., San Francisco	Knoxville
<i>Siskiyou County</i> Avisstone Corp. or E. Bear	a	2800 Board of Trade Bldg., Chicago, Ill., 1600 Golden Gate Ave., San Francisco	Pumice Mt. Davis
George Elder	a	799 Oak St., San Francisco	Macdoel
James Whitt	a	Macdoel	Macdoel
Volcanic Products Co.	a	Harris Trust Bldg., Chicago, Ill.	Macdoel
Dan A. Williams	a	217 Monterey St., Salinas	Mt. Hoffman

a. Pumice. b. Volcanic ash.

## PYRITE

Operator	Address	Location of mine
<i>Shasta County</i> Mountain Copper Co., Wm. F. Kett, Mgr.	112 Market St., San Francisco	Matheson



## QUICKSILVER

Principal Quicksilver Producers in California for 1936, out of a Total of 66 Operating Properties

Mine	Operator	Address	Location of mine
<i>Contra Costa County</i>			
Mt. Diablo	E. W. Erickson	Castella	Clayton
Mt. Diablo	Bradley Mining Co. <sup>1</sup>	Crocker Bldg., San Francisco	Clayton
<i>Fresno County</i>			
Archer	Joseph Byles & Sons	Coalinga	Coalinga
Del Mexico	C. Perez	Mendota	Mendota
<i>Inyo County</i>			
Coso Hot Spring	J. F. Sanders	Little Lake	Little Lake
<i>Lake County</i>			
Great Western	Bumsted Mining Co., E. J. Bumsted	Middletown	Middletown
Great Western	Bradley Mining Co. <sup>2</sup>	Crocker Bldg., San Francisco	Middletown
Helen	H. W. Gould, Owner	Mills Bldg., San Francisco	Middletown
Mirabel	Mirabel Quicksilver Co.	Middletown	Middletown
Sulphur Bank	Bradley Mining Co.	Crocker Bldg., San Francisco	Lower Lake
<i>Napa County</i>			
Aetna	Chas. E. Gray, Owner	Financial Center Bldg., San Francisco	Aetna Springs
Knoxville	George E. Gamble	1431 Waverly St., Palo Alto	Monticello
La Joya	La Joya Quicksilver Mine, Morgan North, Mgr.	Oakville	Oakville
Oat Hill	Oat Hill Mine, Inc., R. A. Hanan, Sec.-Treas.	369 Pine St., San Francisco	Oat Hill
Oat Hill Extension	Zack Anderson	Middletown	Oat Hill
<i>San Benito County</i>			
Aurora	San Benito Mining Co., Ltd.	Box 38, Le Grand	Idria
Clear Creek	W. C. Webster	Hernandez	Hernandez
Florence Mac	Rex Smith	Hernandez	Hernandez
New Idria	New Idria Quicksilver Mines, Inc.	Merchants Exchange Bldg., San Francisco	Idria
New Idria	New Idria Quicksilver Mining Co. <sup>3</sup>	Mills Bldg., San Francisco	Idria
<i>San Luis Obispo County</i>			
Deer Trail	Robert Velus	Box 671, Santa Maria	Huasna
Klau	Klau Mine, Inc.	Mills Bldg., San Francisco	Adelaide
Oceanic	Anglo American Mining Corp.	Mills Bldg., San Francisco	Cambria
Polar Star	E. D. Rogers	San Simeon	San Simeon

<sup>1</sup> Bradley Mining Co. took over Mt. Diablo property in September, 1937.<sup>2</sup> Bradley Mining Co. took over operation of Great Western Mine in April, 1937.<sup>3</sup> The New Idria Quicksilver Mining Co. took over operation of the New Idria Mine in June, 1937.

## QUICKSILVER—Continued

Mine	Operator	Address	Location of mine
<i>Santa Barbara County</i>			
Lion Den.....	Lion Den Mercury Co., J. G. Moore.....	Los Olivos.....	Los Olivos
Red Rock.....	Santa Ynez Mercury Co., Hans Peters, Pres.....	Solvang.....	Solvang
<i>Santa Clara County</i>			
Guadalupe.....	Albert E. Golden.....	237 Wayne Ave., Oakland.....	Los Gatos
Little Almaden.....	Quicksilver Mining Co., P. R. Schneider.....	Los Gatos.....	Almaden
New Almaden Dump.....	Ben Black, Owner.....	Almaden.....	Almaden
<i>Sonoma County</i>			
Cloverdale.....	Cavagnaro & Schor.....	Cloverdale.....	Cloverdale
Cloverdale.....	Evan Bennett <sup>4</sup> .....	Cloverdale.....	Cloverdale
Culver Bear.....	C. A. Baumertster.....	Cloverdale.....	Cloverdale
Esperanza.....	James G. Cotelyou.....	Cloverdale.....	Cloverdale

<sup>4</sup> Evan Bennett took over the Cloverdale Mine in March, 1937.

## SALT

Operator	Address	Location of plant
<i>Alameda County</i>		
Leslie Salt Co.....	310 Sansome St., San Francisco.....	Calipatria
<i>Imperial County</i>		
Imperial Salt Co.....	4000 E. Washington Blvd., Los Angeles.....	-----
<i>Kern County</i>		
Long Beach Salt Co.....	P.O. Box 28, Long Beach.....	Saltdale
<i>Los Angeles County</i>		
Long Beach Salt Co.....	P.O. Box 28, Long Beach.....	Long Beach
<i>Modoc County</i>		
Surprise Valley Salt Works, Joshua H. Hutchinson.....	Box 26, Cedarville.....	Lake City
<i>Mono County</i>		
Venta McPherson.....	Mono Lake.....	Mono Lake

<i>Monterey County</i> Monterey Bay Salt Co., E. C. Vierra, Mgr.	Moss Landing	Moss Landing
<i>Orange County</i> Irvine Salt Co.	Tustin	Tustin
<i>San Bernardino County</i> California Rock-Salt Co. Rock Salt Products Co.	2465 Hunter St., Los Angeles 845 El Centro St., South Pasadena	Amboy Salt Marsh
<i>San Diego County</i> Western Salt Co.	1245 National Ave., San Diego	San Diego
<i>San Mateo County</i> Stauffer Chemical Co.	636 California St., San Francisco	Redwood City

SANDSTONE

Operator	Address	Location of quarry
<i>Monterey County</i> Carnel Stone Quarry, A. L. Possadori Sierra Quarry, Harry Rogers Andrew Stewart	Carnel Box 136, Carnel Carnel Valley	Carnel Carnel Carnel Valley
<i>Napa County</i> H. F. Galbreath	1742 Solano Ave., Berkeley	
<i>San Luis Obispo County</i> Mora Bros.	Box 121, Cambria	Cambria

## SILICA

Operator	Product	Address	Location of mine
<i>Contra Costa County</i> Hazel-Atlas Glass Co. of California, Ltd.	b	89th and G St., Oakland	Summerville
Silica Co. of California, Ltd.	b	Brentwood	Brentwood
<i>Fresno County</i> Industrial Minerals & Chemical Co.	a	836 Gilman St., Berkeley	Friant
<i>Placer County</i> Harry McCormack	a	Alta	Alta
<i>Riverside County</i> P. J. Weisel, Inc.	b	La Habra	Corona
<i>San Bernardino County</i> Teneaseal Clay Co.	c	5601 S. Boyle Ave., Los Angeles	Hicks
<i>San Diego County</i> Standard Sanitary Mfg. Co., R. P. Jones, Mgr.	a	Campo	Campo

a. Quartz. b. Glass sand. c. Quartzite.

## SILLIMANITE-ANDALUSITE-KYANITE GROUP

Operator	Product	Address	Location of mine
<i>Mono County</i> Champion Spark Plug Co., Ceramic Division	Andalusite	Butler Ave. and Grand Trunk R.R., Detroit, Mich.	Mocalma



## SILVER

## Principal Silver Producers in California in 1936

Mine	Type of mine	Operator	Address	Location of mine
<i>Alpine County</i>				
Zaca-----	b	Zaca Mining Corp.	Markleeville	Markleeville
<i>Amador County</i>				
Argonaut-----	a	Argonaut Mining Co., Ltd.	1404 Humboldt Bank Bldg., San Francisco	Jackson
Central Eureka & Old Eureka-----	a	Central Eureka Mining Co.	111 Sutter St., San Francisco	Sutter Creek
Fort Ann-----	a	J. C. Nimmo & F. W. Kent	Volcano	Maricao
Kennedy-----	a	Kennedy Mining & Milling Co.	519 California St., San Francisco	Amador City
Original Amador-----	a	Original Amador Gold Mines	Amador City	
<i>Butte County</i>				
Surecase-----	a	Haeffling Bros.	1000 4th St., Sacramento	Yankee Hill
<i>Calaveras County</i>				
Carson Hill-----	a	Carson Hill Gold Mining Corp.	Sanora	Melones
Gopher Hill-----	d	Gopher Hill Mining Co.	Farmington	Farmington
<i>El Dorado County</i>				
Big Canyon-----	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Shingle Springs
<i>Inyo County</i>				
Cardinal-----	a	Cardinal Gold Mining Co.	Bin D, Bishop	Bishop Creek
Estell & Cerro Gordo-----	c	Estelle Mines Corp.	972 S. 4th Ave., Los Angeles	Keeler
Monte Carlo-----	a	Monte Carlo Mines Co.	Box 236, Lone Pine	Lone Pine
Morning Star-----	a	Keeler Gold Mines, Inc.	972 S. 4th Ave., Los Angeles	Keeler
Reid-----	b	Shively & Peterson, G. W. Dow, Trustee	Keeler	Keeler
Santa Rosa-----	c	Santa Rosa Mine Dev. Co.	Keeler	Keeler
<i>Kern County</i>				
Elephant & Searchlight-----	d	Lodestar Mining Co.	Box 235, Mojave	Mojave
Fairview-----	a	Kelsey, Kelsey & Burton	Rosamond	Rosamond
Golden Queen-----	a	Golden Queen Mining Co.	Mojave	Mojave
Middle Butte-----	a	Middle Butte Mines, Inc.	Rosamond	Rosamond
Soledad Extension-----	a	Soledad Extension Mining Syndicate	1200 Rives-Strong Bldg., Los Angeles	Mojave
Tropico-----	a	Burton Bros., Inc.	Rosamond	Rosamond
Whitmore-----	c	Whitmore Mines, Inc.	Rosamond	Rosamond
Yellow Aster-----	a	Anglo-American Mining Corp.	Mills Bldg., San Francisco	Randsburg

a. Gold mine. b. Silver mine. c. Lead-silver mine. e. Gold dredge. f. Silver-lead-zinc mine. g. Copper mine. h. Tailing dump.

## SILVER—Continued

## Principal Silver Producers in California in 1936

Mine	Type of mine	Operator	Address	Location of mine
<i>Lassen County</i> Golden Eagle & Juniper	a	Hayden Hill Gold Corp.	Symons Bldg., Spokane, Wash.	Adin
<i>Mariposa County</i> Pine Tree & Josephine	a	Pacific Mining Co.	Crocker Bldg., San Francisco	Bear Valley
<i>Mono County</i> Standard	a	Roseclip Mining Co.	1005 Mills Bldg., San Francisco	Bodie
Silverado & Kentuck	b	Sierra Consolidated Mines, Inc.	Wellington, Nev.	Sweetwater, Nev.
<i>Napa County</i> Palisades	d	Coast Range Mining Co.	Calistoga	Calistoga
<i>Nevada County</i> Empire, Pennsylvania, North Star, Murchie & Zellbright	a	Empire Star Mines Co., Inc.	14 Wall St., Rm. 1507, New York, N. Y.	Grass Valley
Empress	a	Republic Gold Mining Corp.	224 Tower Bldg., Santa Monica	Grass Valley
Golden Center	a	Cooley Butler	Rowan Bldg., Los Angeles	Grass Valley
Idaho-Maryland & Brunswick	a	Idaho-Maryland Mines Corp.	Russ Bldg., San Francisco	Grass Valley
Lava Cap	a	Lava Cap Mining Corp.	Box 780, Nevada City	Nevada City
Spanish	a	Bradley Mining Co.	Crocker Bldg., San Francisco	Washington
<i>Orange County</i> Blue Light	f	O. H. Pembler	Silverado	Silverado
<i>Placer County</i> Alabama	a	Alabama California Gold Mines Co.	Box 155, Auburn	Penryn
Auburn Chicago	a	Auburn Chicago Mines Corp.	Citizens National Bank Bldg., Los Angeles	Penryn
<i>Plumas County</i> Walker	g	Walker Mining Co.	821 Kearns Bldg., Salt Lake City, Utah	Walker mine
<i>Riverside County</i> Gold Crown & Nightingale	a	Gold Crown Mining Co., Ltd.	730 Petroleum-Security Bldg., Los Angeles	Twentynine Palms

<i>Sacramento County</i> Natomas	c	Natomas Co.	Forum Bldg., Sacramento	Natomas
<i>San Bernardino County</i> Comanche & Sioux	b	J. B. Osborn	Daggett	Daggett
Coyote	d	C. O. Miltendorf	Randsburg	Red Mountain
Kelly	d	Kelly Gold & Silver Mine, Inc.	Barstow	Barstow
Old Barber Mill	h	Simon Bacon	Red Mountain	Red Mountain
Santa Fe	b	F. H. Lanley		
<i>Shasta County</i> Iron Mountain	a	The Mountain Copper Co., Ltd.	351 California St., San Francisco	Matheson
<i>Sierra County</i> 16 to 1 and Tightner	a	Original 16 to 1 Mines, Inc.	Russ Bldg., San Francisco	Alleghany
<i>Yuba County</i> Yuba	c	Yuba Consolidated Gold Fields	351 California St., San Francisco	Hammonton

## SLATE

	Operator	Product	Address	Location of quarry
<i>Calaveras County</i>				
Pacific Slate Products Corp., Att. Hollis B. Peck			Rittenhouse Bldg., Santa Cruz	Copperopolis
<i>El Dorado County</i>				
Pacific Minerals Co., Ltd.			337 10th St., Richmond	Chili Bar
<i>Inyo County</i>				
Red Slate Quarry, J. D. Leary			Keeler	Keeler
<i>Los Angeles County</i>				
Blue Goose Quarry, Robert Cox			1975 Lundy Ave., Pasadena	Pasadena
<i>Tuolumne County</i>				
Whitney Slate Quarry, W. S. McLean			419 Bayshore Blvd., San Francisco	Hetch Hetchy

## SOAPSTONE AND TALC

Operator	Product	Address	Location of mine
<i>Bulle County</i> McLean Talc Deposit, W. S. McLean	a	419 Bayshore Blvd., San Francisco	McLean Spur
<i>El Dorado County</i> Jim Bernetti Industrial Minerals & Chemical Co. Pacific Minerals Co., Ltd., Chas. S. Renwick, Jr.	a a a	Shingle 836 Gilman St., Berkeley 337 10th St., Richmond	Shingle Latrobe Shrub
<i>Inyo County</i> Mount Whitney Talc Deposit, W. R. Faucett Sierra Talc Co., Franklin Booth, Mgr. Southern Calif. Minerals Co., W. S. Skeoch	b b b	634 S. Spring St., Los Angeles 428 Union League Bldg., Los Angeles 2022 Thayer St., Los Angeles	Darwin Keeler Kingston Mt.
<i>Los Angeles County</i> Binder Bros., W. H. Binder	a	285 N. Lake Ave., Pasadena	Bouquet Canyon
<i>San Bernardino County</i> Pacific Coast Talc Co. Western Talc Co.	b b	2149 Bay St., Los Angeles 1901 E. Stauson Ave., Los Angeles	Silver Lake Acme

a. Soapstone. b. Talc.

## SODA

Operator	Product	Address	Location of plant
<i>Inyo County</i> Natural Soda Products Co. Pacific Alkali Co.	a, b, d a	650 Spring St., Los Angeles 1206 Pacific Mutual Bldg., Los Angeles	Keeler Bartlett
<i>San Bernardino County</i> American Potash & Chemical Co. West End Chemical Co.	a, c a	Trona 706 Syndicate Bldg., Oakland	Trona West End

a. Soda Ash. b. Sodium Bicarbonate. c. Salt Cake. d. Trona.



## STONE, MISCELLANEOUS

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

NOTE.—The California State Highway Commission, the various counties, U. S. Forest Service and U. S. Bureau of Public Roads produces both crushed rock and sand and gravel in various places in the State used in construction and maintenance of highways, but not specified in this listing.

Operator	Product	Address	Location of pit or quarry
<i>Alameda County</i>			
California Rock & Gravel Co.	a	500 Call Bldg., San Francisco	Livermore
Farmers Land Co., Ltd.	a	C and 7th Sts., Hayward	Hayward
Healey-Moore Co., Leona Quarry	b	344 High St., Oakland	Oakland
Henry L. Kaiser Co.	a, b	1522 Latham Square Bldg., Oakland	Radium
Langdon Molding Sand, J. H. Langdon	c	R.F.D., Box 89, Niles	Decoto
Red Shale Quarry, W. S. McLean	d	419 Bayshore Blvd., San Francisco	Arroyo Mochlo
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Eliot and Niles
Alfred W. Petersen	a	Box 943, Livermore	Livermore
Russell Bros. Quarry, B. & L. Russell	b	1192 Russell Way, Hayward	Hayward
San Leandro Rock Co., Lake Chabot Quarry	b	2485 Washington St., San Leandro	Lake Chabot
Southern Pacific R.R. Co., Asst. Chief Engineer	a, b	Southern Pacific Bldg., San Francisco	Eliot, Niles, Radium
<i>Butte County</i>			
Bechtel-Kaiser Co., R. J. Kennedy, Mgr.	a, b	Oroville	Oroville
Cherokee Sand and Gravel Co., F. E. Myers	a	R.F.D. 4, Box 127, Chico	Cherokee Flat
J. E. Johnson Rock Co.	b	Weber Ave. and E St., Stockton	Chico
McLean's Quarry, W. S. McLean	d	419 Bayshore Blvd., San Francisco	McLean Spur
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Oroville
<i>Calaveras County</i>			
Pacific Minerals Co., Ltd.	d	337 10th St., Richmond	Angels
<i>Contra Costa County</i>			
Antioch Asphalt Sand Co.	a	2008 Mission St., San Francisco	Antioch
Basalt Rock Co.	a	8th St., Napa	Antioch
Blake Bros. Co., Anson Blake	b	204 Balboa Bldg., San Francisco	Point Richmond
Hutchinson Co., Stege Quarry	b	326 17th St., Oakland	Stege
Oak Point Sand Co., Robert P. Easley, et al.	b	Antioch	Antioch
Ed Roberts	c	Pittsburg	Pittsburg
Silica Co. of Calif., Ltd.	c	Brentwood	Brentwood
Southern Pacific R.R. Co., Asst. Chief Engineer	a	Southern Pacific Bldg., San Francisco	Newlove
E. Stamm	a	Antioch	Antioch

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
<i>El Dorado County</i> Diamond Springs Lime Co.	b	Diamond Springs	
<i>Fresno County</i> Grant-Service Rock Co., Cons. Pacific Coast Aggregates, Inc.	a, b b	T. W. Patterson Bldg., Fresno 85 2d St., San Francisco	El Prado Piedra
<i>Glenn County</i> Southern Pacific Co. E. B. Bishop	a a	65 Market St., San Francisco Box 325, Orland	Wyo Wyo
<i>Humboldt County</i> D. A. Boyd Mercer-Fraser Co. Northwestern Pacific R.R. Co., Wm. N. Neff, Gen. Supt.	a a a	R.F.D., Arcata 2d and Commercial Sts., Eureka Sausalito	Arcata Essex South Fork
<i>Imperial County</i> Pot holes Granite Quarry, U. S. Bureau of Reclamation	a	Winterhaven, c/o Yuma, Arizona	Winterhaven
<i>Inyo County</i> Inyo Marble Co.	a	726-732 E. 29th St., Los Angeles	Lone Pine
<i>Kern County</i> Bakersfield Rock and Gravel Co. Kern Rock Co., Ltd.	a, b a, b	Box 395, Station A, Bakersfield Box 1697, Bakersfield	Kern River
<i>Lassen County</i> Red River Lumber Co.	b	Westwood	Westwood
<i>Los Angeles County</i> Arrow Rock Co. A. T. & S. F. R.R., F. L. Hibbard, Gen. Mgr. Azusa Rock & Sand Co. Richard R. Ball Blue Diamond Corp., Ltd. Wm. J. Bonfield Consolidated Rock Products Co. Ducey & Atwood Rock Co., R. K. Atwood, Pres. Eaton Canyon Rock and Sand Co. W. F. Glasser, Inc. Graham Bros.	a a a, b a a g a, b a, b a, b b a, b	Box 155, Monrovia 609 Kerekhoff Bldg., Los Angeles R.F.D., Azusa Box 233, Walhalla 1650 S. Alameda St., Los Angeles 2008 Laurel Canyon Rd., Los Angeles 2730 S. Alameda St., Los Angeles Box 194, East Pasadena 2350 E. Colorado St., Pasadena 713 N. Sepulveda, Brentwood Heights, Los Angeles 3425 Fowler Ave., Los Angeles	Monrovia Forbes Azusa Walhalla El Monte and Roscoe Hollywood Whittier and Fullerton East Pasadena Pasadena Brentwood Heights Catalina Island and Roscoe

Granite Material Co.	g	8200 Tujunga Ave., Roseoe	Roseoe
Haines Canyon Rock Co., John M. Ferry,	a, b	5201 San Fernando, Glendale	Glendale
Lindauer Corp.	a	Box 208, La Habra	La Habra
Los Angeles Harbor Dept., Bureau of Maintenance	b	City Hall, San Pedro	Santa Catalina
Los Angeles Dept. of Water and Power	a	207 S. Broadway, Los Angeles	Los Angeles
Los Angeles Decomposed Granite Co.	g	2171 W. Washington, Los Angeles	Los Angeles
Pacific Rock & Gravel Co.	a, b	458 S. Spring St., Los Angeles	Los Angeles
Reynolds Crushed Gravel	b, g	920 N. Humphreys Ave., Los Angeles	Catalina Island
H. W. Rohl & Co.	b	4351 Alhambra Ave., Los Angeles	Longita
Edwin Sidebotham & Son, Inc., Sidebotham Sand Plant	a	McFarland and L Sts., Wilmington	
West Slope Construction Co.	b	Azusa	
<i>Madera County</i>			
McGilvray Raymond Corp.	a	3 Potrero Ave., San Francisco	Raymond
Southern Pacific Co.	b	65 Market St., San Francisco	Knowles
Stewart & Nuss	b	410 Throne St., Fresno	Herdorn
Valley Feed & Fuel Co.	a	Madera	Madera
<i>Marin County</i>			
Daniels Const. Co.	b	503 Market St., San Francisco	San Rafael
Hutchison Co.	b	329 17th St., Oakland	San Quentin
<i>Mariposa County</i>			
Yosemite National Park	a, b	Yosemite	Yosemite Nat'l Park
<i>Mendocino County</i>			
Ukiah Gravel & Cement Co., John Freitas	a	Ukiah	Ukiah
<i>Merced County</i>			
Fred Bagsdale	a, b	Merced	Merced
<i>Monterey County</i>			
Del Monte Properties, C. S. Olmsted	a, c	Del Monte	Del Monte
M. J. Murphy	b	Monte Verde and 9th Sts., Carmel	Carmel
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Lapis and Prattco
Pacific Coast Steel Corp., F. E. Watts	b	20th and Illinois, San Francisco	Natividad
S. Ruthven, Seaside Sand Pit	a	Seaside	Seaside
Southern Pacific Co.	a	65 Market St., San Francisco	Lapis
<i>Napa County</i>			
Basalt Rock Co.	b	8th St., Napa	Napa
Errington Quarry, M. L. Reidenbach	b	Napa	Napa
S. F., Napa & Calistoga R.R. Butala Gravel Pit, C. E.	a	Napa	St. Helena
Brown, Mgr.	a	Napa	St. Helena
Thorsen Gravel Pit, Harry Thorsen	a	St. Helena	St. Helena

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

## STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
<i>Nevada County</i>			
Golden Center Mine, L. S. Wineapaw, Mgr.	b	Grass Valley	Grass Valley
Independent Construction Co.	b	Foot of 47th Ave., Oakland	Grass Valley
Netz Granite Quarry, Ludwig Netz	b	Nevada City	Nevada City
<i>Orange County</i>			
Consolidated Rock Products Co.	a	2730 S. Alameda St., Los Angeles	Fullerton and Orange
Graham Bros.	a, b	3425 Fowler Ave., Los Angeles	El Modena
National Cement Pipe Co.	a	Drawer K, Santa Ana	Santa Ana
B. A. Stoffel	a	Anaheim	Anaheim
Ralph Welch	a	2609 W. Chapman St., Orange	Orange
<i>Placer County</i>			
Pacific Gas & Elec. Co., W. G. Vincent, V. Pres. and Ex. Eng.	b	245 Market St., San Francisco	Cisco
Roseville Sand Co.	a	115 Jones St., Roseville	Roseville
Union Granite Co., Mar Ruhkala	b	Rocklin	Rocklin
Victor Wickman	b	Rocklin	Rocklin
<i>Riverside County</i>			
A. T. & S. F. R.R. Co., L. L. Hibbard, Gen. Mgr.	b	609 Kerchhoff Bldg., Los Angeles	Corona
Kuster & Waterburg	a	Corona	Corona
Palo Verde Commercial Co.	a	Blythe	Blythe
City of Riverside	b	Riverside	Riverside
Rohl-Connolly Co., Ormand Quarry	b	4351 Valley Blvd., Los Angeles	Bly Junction
The Service Gravel Co., F. A. Braman	a	4324 10th St., Riverside	Riverside
P. J. Weisel, Industrial Sands	a, e	La Habra	Corona
<i>Sacramento County</i>			
Cannon & Co.	e	Box 281, Sacramento	Ben Ali
Del Paso Rock & Gravel Co.	a, b	11 St. Rd., Sacramento	Del Paso
Folsom State Prison	b	Represa	Represa
Lord & Bishop	a	Native Sons Bldg., Sacramento	American River
Mueke Sand & Gravel	a	Mayhew, c/o Perkins	
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Fair Oaks, Mayhew and American River
Perkins Gravel Co.	a, b	Perkins	Perkins
Robert Powell & Co.	a	Box 815, Sacramento	American River
<i>San Benito County</i>			
Granite Rock Co.	b	Drawer M, Watsonville	Logan
Southern Pacific Co.	a, b	65 Market St., San Francisco	Logan



*San Bernardino County*

A. T. & S. F. R.R.	a	609 Kerekhoff Bldg., Los Angeles	Gale
Commercial Rock Co.	a, b	14th and Campus, Upland	Upland
Consolidated Rock Products Co.	a	2730 S. Alameda St., Los Angeles	
Deelezville Stone Co., Ltd.	b	Box 698, San Pedro	South Fontana
Hanawalt Bros.	a, b	2151 D St., La Verne	La Verne
Fourth Street Rock Crusher, A. O. Johnson	d	San Bernardino	San Bernardino
Pacific Minerals, Inc.	a, b	337 10th St., Richmond	Barstow
Redlands Gravel Co.	a, b	Redlands	Redlands
San Bernardino Rock & Gravel Co.	a, b	Box 249, San Bernardino	San Bernardino
Triangle Rock & Gravel Co.	a, b	San Bernardino	

*San Diego County*

Calaveras Materials Co.	b	Oceanside	Oceanside
Canyon Rock Co.	a, b	3911 5th Ave., San Diego	San Diego
Crystal Silica Sand Co.	a	Oceanside	Oceanside
H. G. Fenton Material Co.	a	13th and Imperial Ave., San Diego	San Diego
R. E. Hazard Contracting Co., Inc.	a, b	2548 Kettner Blvd., San Diego	Jacumba
Jones & Klinger, E. J. Klinger	a	Mission Valley, San Diego	Mission Valley
R. M. Hubbard	c	406 W. Nutmeg St., San Diego	San Diego
Nelson & Sloan	a	Box 832, Chula Vista	Chula Vista
Oceanside Rock & Sand Co.	a	Carlsbad	Oceanside

*San Francisco County*

Mission Quarry Co.	b	210 Balboa Bldg., San Francisco	San Francisco
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*San Joaquin County*

Frank Marks	a	Newman	Tracy
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Riverbank
Santa Fe Sand and Gravel Co., W. A. Arlington	a	Box 271, Escalon	Escalon
Elmer J. Warner	a	1128 E. Roosevelt St., Stockton	Stockton

*San Luis Obispo County*

Gularte Gravel Pit, M. Gularte	a	Santa Margarita	Santa Margarita
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*San Mateo County*

Golden West Quarry	b	South San Francisco	South San Francisco
Holy Cross Cemetery	b	Colma	Colma
Industrial Mineral Products, W. B. Vestal, Pres.	c	400 7th St., San Francisco	Daly City
Market Street Ry. Co., Daly's Quarry	b	58 Sutter St., San Francisco	

*Santa Barbara County*

Gates Gravel Plant, Frank H. Gates	a	Santa Maria	Sisquoc
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*Santa Clara County*

Arrowhead Gravel Co.	a	Maple Ave., Watsonville	Sargent
Carroll Gravel Pit, R. D. Carroll	a	R.F.D. 4, Box 310A, San Jose	San Jose
Chas. W. Hamilton	a	Senter Rd., San Jose	San Jose
Jas. A. Lennieux	a	Box 341, Senter Rd., San Jose	San Jose

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

## STONE, MISCELLANEOUS—Continued

Under the heading of 'miscellaneous stone' there are four divisions—crushed rock, grinding mill pebbles, paving blocks, and sand and gravel. Crushed rock includes crushed rock that is used in macadam, ballast and for concrete; also rock used for rubble and riprap.

Operator	Product	Address	Location of pit or quarry
<i>Santa Clara County—Continued</i>			
Los Gatos Sand and Gravel Co.	a	Los Gatos	Los Gatos
Martin Bros.	a	R. F. D. 2, Box 205A, San Jose	
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Coyote and Campbell
Rhodes & Robinson, Stanford Quarry	b	Box 325, Palo Alto	Palo Alto
Henry Sand	a	1018 Malone Rd., San Jose	
City of San Jose	a	San Jose	San Jose
Southern Pacific Co.	a	65 Market St., San Francisco	Coyote
Sunnyvale Gravel Co.	a	Sunnyvale	Sunnyvale, Alamitos
<i>Santa Cruz County</i>			
Atlas Olympia Co.	a	209 Underwood Bldg., San Francisco	Olympia
Central Supply Co.	a	Box 524, Santa Cruz	Santa Cruz
Pacific Limestone Products Co.	b	Santa Cruz	Santa Cruz
Santa Cruz Portland Cement Co.	b	Crocker Bldg., San Francisco	Davenport
<i>Shasta County</i>			
Diestelhorst Gravel Plant, Chas. Diestelhorst	a, b	1040 Liberty St., Redding	Redding
Southern Pacific R.R. Co., Asst. Chief Engineer	c	Southern Pacific Bldg., San Francisco	Kennett
<i>Siskiyou County</i>			
King Solomon Mines Co.	f	Crocker Bldg., San Francisco	Black Bear
W. D. Miller Cons. Co.	a	Klamath Falls, Ore.	Graham Siding
Southern Pacific R.R. Co., Asst. Chief Engineer	c	Southern Pacific Bldg., San Francisco	Kegg
<i>Solano County</i>			
J. M. Nelson, Cordelia Quarry	b	Cordelia	Cordelia
<i>Sonoma County</i>			
Basalt Rock Co.	a	8th St., Napa	Healdsburg
Hein Bros. Basalt Rock Co., Mark Hein, Pres.	b	Petaluma	Petaluma
Petaluma and Santa Rosa, E. R. R., E. H. Maggard, Mgr.	b	Petaluma	Stony Point
Stony Point Quarry, W. A. Wilson	b	Petaluma, Star Route	Stony Point
<i>Stanislaus County</i>			
Atlas Olympia Co.	a	209 Underwood Bldg., San Francisco	Orange Blossom
Fox Bros.	a	Hughson	Hughson
Hammatt Gravel Plant, V. M. Hammatt	a	Hughson	Hughson
W. Haslan	a	Oakdale	Oakdale

Frank B. Marks	a	Newman	Newman
Oakdale Irrigation Dist.	a	Oakdale	Oakdale
Putnam Sand & Gravel Co.	a	Modesto	Modesto
Rinehart Sand Pit, Rinehart Bros.	a	Modesto	Modesto
J. P. Scanlon, Scanlon Gravel Pit	a	Patterson	Crows Landing
Southern Pacific Co.	a	65 Market St., San Francisco	Newman
Chas. Warner	a	Modesto	
<i>Trinity County</i>			
S. Eastwood	a	Douglas City	
<i>Tulare County</i>			
J. J. Dugan & Sons	a	R.F.D. 2, Box 120, Porterville	Porterville
O. C. Joffers	a	Star Rt. 2, Porterville	Porterville
Pacific Coast Aggregates, Inc.	a, b	85 2d St., San Francisco	Lemon Cove and Lindsay
Porterville Cement Pipe Co.	a	Box 396, Porterville	Porterville
<i>Ventura County</i>			
El Rio Rock Co.	a, b	Box 381, Ventura	El Rio
Montalvo Rock Co.	a	Box 188, Montalvo	Montalvo
Piru Rock Co.	a, b	Piru	Piru
Santa Paula Rock Co.	a	Willard Bridge, Santa Paula	Santa Paula
Saticoy Rock Products Co.	a, b	Ventura	Saticoy-Ventura
J. S. Toler	c	1257 Poli St., Ventura	Ventura
Southern Pacific Co.	a, b	65 Market St., San Francisco	Rockbank and Christian
<i>Yolo County</i>			
Leroy Kerr	a	Yolo	Yolo
Frank Newman	a	Woodland	Woodland
Joe Schwarzsgruber	a	Woodland	Woodland
George Summers	a	Woodland	Woodland
Yolo Gravel Co.	a	Box 7, Yolo	Yolo
<i>Yuba County</i>			
Hemstreet & Bell	a, b	501 11th St., Marysville	Marysville
N. F. Mahle	a	715 D St., Marysville	Marysville
Pacific Coast Aggregates, Inc.	a	85 2d St., San Francisco	Marysville
Yuba River Sand Co.	a	Marysville	Marysville

a. Sand and gravel. b. Crushed rock (macadam, ballast, rubble, riprap, etc.). c. Molding sand. d. Granules for roofing, terrazzo. e. Slag and volcanic cinder. f. Tubemill pebbles. g. Decomposed granite.

SULPHUR

Operator	Address	Location of mine
<i>Inyo County</i> Sulphur Diggers, Inc., Edward G. Chandler	723 Balboa Bldg., San Francisco	Zurich

TUNGSTEN

Operator	Address	Location of mine
<i>Inyo County</i> El Diablo Mining Co., H. O. Johanson	Kernville	Bishop
<i>San Bernardino County</i> Atolia Mining Co., Atolia-Rand Placers, Inc.	Crocker Bldg., San Francisco 215 W. 5th St., Los Angeles	Randsburg Atolia

ZINC

Mine	Operator	Address	Location of mine
<i>Orange County</i> Blue Light	O. H. Perubler	Silverado	Silverado
<i>Tulare County</i>	Joseph R. Geranimo	218 4th St., San Francisco	Lemon Grove



## APPENDIX

## MINING BUREAU ACT

Chap. 670 [Stats. 1913]; amended, Chap. 280 [Stats. 1929]; amended, Chap. 748 [Stats. 1933].

An act establishing a state mining bureau, creating the office of state mineralogist, fixing his salary and prescribing his powers and duties; providing for the employment of officers and employees of said bureau, making it the duty of persons in charge of mines, mining operations and quarries to make certain reports, providing for the investigation of mining operations, dealings and transactions and the prosecution for defrauding, swindling and cheating therein, creating a state mining bureau fund for the purpose of carrying out the provisions of this act and repealing an act entitled "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to be known as the board of trustees of the state mining bureau, who shall have the direction, management and control of said state mining bureau, and to provide for the appointment, duties, and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, and all acts amendatory thereof and supplemental thereto or in conflict herewith.

[Approved June 16, 1913. In effect August 10, 1913.]

[Amendment (Sec. 16) approved May 14, 1929. In effect August 14, 1929.]

[Amendment (Sec. 10) approved June 5, 1933. In effect August 21, 1933.]

*The people of the State of California do enact as follows:*

SECTION 1. There is hereby created and established a state mining bureau. The chief officer of such bureau shall be the state mineralogist, which office is hereby created.

SEC. 2. It shall be the duty of the governor of the State of California and he is hereby empowered to appoint a citizen and resident of this state, having a practical and scientific knowledge of mining, to the office of state mineralogist. Said state mineralogist shall hold his office at the pleasure of the governor. He shall be a civil executive officer. He shall take and subscribe the same oath of office as other state officers. He shall receive for his services a salary of three hundred dollars (\$300) per month, to be paid at the same time and in the same manner as the salaries of other state officers. He shall also receive his necessary traveling expenses when traveling on the business of his office. He shall give bond for the faithful performance of his duties in the sum of ten thousand dollars (\$10,000), said bond to be approved by the governor of the State of California.

SEC. 3. Said state mineralogist shall employ competent geologists, field assistants, qualified specialists and office employees when necessary in the execution of his plans and operations of the bureau, and fix their compensation. The said employees shall be allowed their necessary traveling expenses when traveling on the business of said department and shall hold office at the pleasure of said state mineralogist.

SEC. 4. It shall be the duty of said state mineralogist to make, facilitate, and encourage, special studies of the mineral resources and mineral industries of the state. It shall be his duty: to collect statistics concerning the occurrence and production of the economically important minerals and the methods pursued in making their valuable constituents available for commercial use; to make a collection of typical geological and mineralogical specimens, especially those of economic and commercial importance, such collection constituting the museum of the state mining bureau; to provide a library of books, reports, drawings, bearing upon the mineral industries, and sciences of mineralogy and geology, and arts of mining and metallurgy, such library constituting the library of the state mining bureau; to make a collection of models, drawings and descriptions of the mechanical appliances used in mining and metallurgical processes; to preserve and so maintain such collections

and library as to make them available for reference and examination, and open to public inspection at reasonable hours; to maintain, in effect, a bureau of information concerning the mineral industries of this state, to consist of such collections and library, and to arrange, classify, catalogue, and index the data therein contained, in a manner to make the information available to those desiring it; to issue from time to time such bulletins as he may deem advisable concerning the statistics and technology of the mineral industries of this state.

SEC. 5. It is hereby made the duty of the owner, lessor, lessee, agent, manager or other person in charge of each and every mine, of whatever kind or character, within the state, to forward to the state mineralogist, upon his request, at his office not later than the thirty-first day of March, in each year, a detailed report upon forms which will be furnished showing the character of the mine, the number of men then employed, the method of working such mine and the general condition thereof, the total mineral production for the past year, and such owner, lessor, lessee, agent, manager or other person in charge of any mine within the state must furnish whatever information relative to such mine as the state mineralogist may from time to time require for the proper discharge of his official duties. Any owner, lessor, lessee, agent, manager or other person in charge of each and every mine of whatever kind or character within the state, who fails to comply with the above provisions shall be deemed guilty of a misdemeanor.\*

SEC. 6. The state mineralogist now performing the duties of the office of state mineralogist shall perform the duties of the office of state mineralogist as in this act provided until the appointment and qualification of his successor as in this act provided.

SEC. 7. The said state mineralogist shall take possession, charge and control of the offices now occupied and used by the board of trustees and state mineralogist and the museum, library and laboratory of the mining bureau located in San Francisco as provided for by a certain act of the legislature approved March 23, 1893, and hereafter referred to in section fourteen hereof, and shall maintain such offices, museum, library and laboratory for the purposes provided in this act.

SEC. 8. Said state mineralogist or qualified assistant shall have full power and authority at any time to enter or examine any and all mines, quarries, wells, mills, reduction works, refining works and other mineral properties or working plants in this state in order to gather data to comply with the provisions of this act.

SEC. 9. The state mineralogist shall make a biennial report to the governor on or before the fifteenth day of September next preceding the regular session of the legislature.

SEC. 10. All moneys received by the State Mining Bureau (or State Division of Mines) or any officer thereof, from sales of publications issued by said bureau, shall be deposited at least once each month in the State treasury to the credit of a fund which is hereby created and designated "Division of mines revolving printing fund." Said fund shall be used and is hereby appropriated for the use of said bureau in addition to such other funds as may be from time to time appropriated by the Legislature, for the printing and publishing of reports, bulletins, and maps issued by the said bureau. The State Controller is authorized to require financial reports from the State Mining Bureau or any officer thereof.

SEC. 11. The said state mineralogist is hereby authorized and empowered to receive on behalf of this state, for the use and benefit of the state mining bureau, gifts, bequests, devises and legacies of real or other property and to use the same in accordance with the wishes of the donors, and if no instructions are given by said donors, to manage, use, and dispose of the gifts and bequests and legacies for the best interests of said state mining bureau and in such manner as he may deem proper.

SEC. 12. The state mineralogist may, whenever he deems it advisable, prepare a special collection of ores and minerals of California to be sent to or used at any world's fair or exposition in order to display the mineral wealth of the state.

SEC. 13. The state mineralogist is hereby empowered to fix a price upon and to dispose of to the public, at such price, any and all publications of the state mining bureau, including reports, bulletins, maps, registers or other publications, such price shall approximate the cost of publication and distribution. Any and all sums derived from such disposition, or from gifts or bequests made, as hereinbefore pro-

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\* Sec. 19 of the Penal Code of California provides: "Except in cases where a different punishment is prescribed by this code, every offense declared to be a misdemeanor is punishable by imprisonment in a county jail not exceeding six months, or by a fine not exceeding five hundred dollars, or by both."



vided, must be accounted for by said state mineralogist and turned over to the state treasurer to be credited to the mining bureau fund as provided for in section ten. He is also empowered to furnish without cost to public libraries the publications of the bureau and to exchange publications with other geological surveys and scientific societies, etc.

SEC. 14. The state mineralogist provided for by this act shall be the successor in interest of the board of trustees of the state mining bureau, and the state mineralogist, under and by virtue of that certain act, entitled "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to be known as the board of trustees of the state mining bureau, who shall have the direction, management, and control of said state mining bureau, and to provide for the appointment, duties, and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, and all books, papers, documents, personal property, records, and property of every kind and description obtained or possessed, or held or controlled by the said board of trustees of the said state mining bureau, and the state mineralogist, and the clerks and employees thereof, under the provisions of said act of March 23, 1893, or any act supplemental thereto or amendatory thereof, shall immediately be turned over and delivered to the said state mineralogist herein provided for, who shall have charge and control thereof.

SEC. 15. That certain act entitled, "An act to provide for the establishment, maintenance, and support of a bureau, to be known as the state mining bureau, and for the appointment and duties of a board of trustees, to be known as the board of trustees of the state mining bureau, and to provide for the appointment, duties and compensation of a state mineralogist, who shall perform the duties of his office under the control, direction, and supervision of the board of trustees of the state mining bureau," approved March 23, 1893, together with all acts amendatory thereof and supplemental thereto and all acts in conflict herewith are hereby repealed.

SEC. 16. For the purpose of this act and as used herein the term "mine" is hereby defined to embrace and include all mineral bearing properties of whatever kind or character whether underground, quarry, pit, well, spring or other source from which any mineral substance is or may be obtained, and the term "mineral" for the purposes of this act and whenever so used shall embrace and include any and all mineral products both metallic and nonmetallic, solid, liquid or gaseous, and mineral waters of whatever kind or character.

## DEPARTMENT OF NATURAL RESOURCES ACT

Chap. 128 [Stats. 1927]; amended, Chap. 307 [Stats. 1929.]

An act to add a new article to chapter three of title one of part three of the Political Code to be numbered article two j, embracing sections three hundred seventy-three to three hundred seventy-three i, relating to a department of natural resources.

[Approved by the Governor April 13, 1927.]

[Amendment approved May 18, 1929.]

*The people of the State of California do enact as follows:*

SECTION 1. The Political Code is hereby amended by adding a new article to chapter III of title I of part III thereof, to be numbered article IIj, embracing sections 373 to 373i and to read as follows:

## ARTICLE IIj.

## DEPARTMENT OF NATURAL RESOURCES

373. A department of the government of the State of California to be known as the department of natural resources is hereby created. The department shall be conducted under the control of an executive officer to be known as the director of natural resources, which office is hereby created. The director shall be appointed by and hold office at the pleasure of the governor and shall receive a salary of six thousand dollars per annum.

Except as in this article otherwise provided, the provisions of article II of this chapter, title, and part of the Political Code as adopted at the forty-fourth session of the Legislature and as the same may be amended from time to time, shall govern and apply to the conduct of the department of natural resources in every respect the same as if such provisions were herein set forth at length and wherever in said article II the term "head of the department" or similar designation occurs, the same shall for the purposes of this article mean the director of natural resources.

373a. For purposes of administration the department shall be forthwith organized by the director thereof, subject to the approval of the governor, in such manner as he shall deem necessary to properly segregate and conduct the work of the department, and the director shall have power to appoint, in accordance with the civil service and other provisions of law, such deputies, officers and other expert and clerical assistants as may be necessary. The work of the department is hereby divided into at least four divisions to be known as the division of forestry, the division of parks, the division of fish and game, and the division of mines.

373b. The division of mines shall be administered through a chief who shall be appointed by the director of natural resources upon the nomination of the state mining board, the chief to be a technically trained mining engineer and to be known as the state mineralogist; such chief shall receive a salary of six thousand dollars per annum. General policies for the guidance of the division of mines shall be determined by a board to be known as the state mining board, which shall consist of five members appointed by and to hold office at the pleasure of the governor.

373c. The division of forestry shall be administered through a chief of division who shall be known as the state forester, who shall be a technically trained forester, appointed by the director of natural resources upon nomination by the state board of forestry hereinafter provided. General policies for the guidance of the division of forestry shall be determined by a state board of forestry which shall consist of seven members appointed by and holding office at the pleasure of the governor. Of the seven members one shall be familiar with the pine timber industry, one with the redwood industry, one with the live stock industry, one with general agriculture and one with the problems of water conservation.



373d. The division of parks shall be administered through a chief of division who shall be appointed by the director of natural resources upon nomination by the state park commission hereinafter provided. General policies for the administration of the state park system shall be determined by the state park commission which is hereby created to consist of five members appointed by the governor and holding office at his pleasure.

373e. The division of fish and game shall be administered through a fish and game commission consisting of three members appointed by and holding office at the pleasure of the governor.

373f. The chiefs of the divisions of forestry and parks respectively shall receive such salaries as may be determined by the director with the approval of the governor. The director of natural resources and the chief of each division before entering upon his duties shall execute to the State of California an official bond in the penal sum of twenty-five thousand dollars conditioned upon the faithful performance of his duties. The members of the board of forestry, the state parks commission and fish and game commission shall serve without compensation, but shall be entitled to their actual expenses incurred in the performance of their duties.

373g. The department of natural resources shall succeed to and is hereby invested with all the duties, powers, purposes, responsibilities and jurisdiction of the state mining bureau, state mineralogist, department of petroleum and gas, state oil and gas supervisor, state forester, state board of forestry, California redwood park commission, San Pasqual battlefield commission, Mount Diablo park commission, state fish and game commission, state fish and game commissioners, and, except as herein otherwise provided, of the several officers, deputies and employees of such bodies and offices, and whenever by the provisions of any statute or law now in force or that may hereafter be enacted a duty or jurisdiction is imposed or authority conferred upon any of said officers, offices, bodies, deputies or employees by any statute the enforcement of which is transferred to the department, such duty, jurisdiction and authority are hereby imposed upon and transferred to the department of natural resources and the appropriate officers thereof with the same force and effect as though the title of said department of natural resources had been specifically set forth and named therein in lieu of the name of any such body, office, officer, deputy or employee. Said bodies and offices, the duties, powers, purposes, responsibilities and jurisdiction of which are so transferred and vested in the department of natural resources, and the positions of all officers, deputies and employees thereunder, are and each of them is hereby abolished and shall have no further legal existence, but the statutes and laws under which they existed and all laws prescribing their duties, powers, purposes, responsibilities and jurisdiction, together with all lawful rules and regulations established thereunder are hereby expressly continued in force.

The department of natural resources shall be in possession and control of all records, books, papers, offices, equipment, supplies, moneys, funds, appropriations, land and other property real or personal now or hereafter held for the benefit or use of said bodies, offices and officers.

The boards of district oil and gas commissioners, the offices of district oil and gas commissioners and the board of review, correction and equalization created by the act approved June 10, 1915, establishing the department of petroleum and gas, are hereby respectively continued in force with the powers, duties, responsibilities and jurisdiction in them vested by the provisions of said act approved June 10, 1915, as amended; *provided*, that said board of review shall consist of the director of natural resources, the director of finance and the chairman of the state board of equalization.

373h. The management and control of the property acquired by the State of California under or pursuant to the provisions of the act entitled "An act to accept the gift to the state of San Pasqual battlefield in San Diego county, to provide for collecting and systematizing the history of said battle, for determining the exact location thereof, and to report a suitable method of marking said battlefield and commemorating the heroism of those Americans who fought and died there," approved May 11, 1919, is hereby transferred to and vested in the department of natural resources.

373i. From and after the date upon which this act takes effect, the department of natural resources shall be and is hereby authorized and empowered to expend the moneys in any appropriation or in special fund in the state treasury

now remaining or made available by law for the administration of the provisions of all the statutes the administration of which is committed to the department, or for the use, support, or maintenance of any board, bureau, commission, department, office or officer whose duties, powers, and functions are, by the provisions of this article, transferred to and conferred upon the department of natural resources. Such expenditures by the department shall be made in accordance with law in carrying out the purposes for which such appropriations were made or such special funds created.

PUBLICATIONS OF THE DIVISION OF MINES

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During the past fifty-four years, in carrying out the provisions of the organic act creating the former California State Mining Bureau, there have been published many reports, bulletins and maps which go to make up a library of detailed information on the mineral industry of the State, a large part of which could not be duplicated from any other source.

One feature that has added to the popularity of the publications is that many of them have been distributed without cost to the public, and even the more elaborate ones have been sold at a price which barely covers the cost of printing.

Owing to the fact that funds for the advancing of the work of this department have usually been limited, the reports and bulletins mentioned are printed in limited editions many of which are now entirely exhausted.

Copies of such publications are available, however, in the offices of the Division of Mines, in the Ferry Building, San Francisco; State Building, Los Angeles; State Office Building, Sacramento; Redding; and Division of Oil and Gas at Santa Barbara, Santa Paula, Coalinga, Taft, Bakersfield. They may also be found in many public, private and technical libraries in California and other states and foreign countries.

A catalog of all publications from 1880 to 1917, giving a synopsis of their contents, is issued as Bulletin No. 77.

Publications in stock may be obtained by addressing any of the above offices and enclosing the requisite amount in the case of publications that have a list price. Only coin, stamps or money orders should be sent, and it will be appreciated if remittance is made in this manner rather than by personal check.

Money orders should be made payable to the Division of Mines.

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NOTE.—The Division of Mines frequently receives requests for some of the early Reports and Bulletins now out of print, and it will be appreciated if parties having such publications and wishing to dispose of them will advise this office.



## REPORTS

Asterisks (\*\*) indicate the publication is out of print.

	Price Postpaid
**First Annual Report of the State Mineralogist, 1880, 43 pp. Henry G. Hanks -----	
**Second Annual Report of the State Mineralogist, 1882, 514 pp., 4 illustrations, 1 map. Henry G. Hanks-----	
**Third Annual Report of the State Mineralogist, 1883, 111 pp., 21 illustrations. Henry G. Hanks-----	
**Fourth Annual Report of the State Mineralogist, 1884, 410 pp., 7 illustrations. Henry G. Hanks-----	
**Fifth Annual Report of the State Mineralogist, 1885, 234 pp., 15 illustrations, 1 geological map. Henry G. Hanks-----	
Sixth Annual Report of the State Mineralogist, Part I, 1886, 145 pp., 3 illustrations, 1 map. Henry G. Hanks-----	\$0.70
Part II, 1887, 222 pp., 36 illustrations. William Irelan, Jr.-----	.70
**Seventh Annual Report of the State Mineralogist, 1887, 315 pp. William Irelan, Jr. -----	
**Eighth Annual Report of the State Mineralogist, 1888, 948 pp., 122 illustrations. William Irelan, Jr.-----	
Ninth Annual Report of the State Mineralogist, 1889, 352 pp., 57 illustrations, 2 maps. William Irelan, Jr.-----	1.15
**Tenth Annual Report of the State Mineralogist, 1890, 983 pp., 179 illustrations, 10 maps. William Irelan, Jr.-----	
Eleventh Report (First Biennial) of the State Mineralogist, for the two years ending September 15, 1892, 612 pp., 73 illustrations, 4 maps. William Irelan, Jr.-----	1.25
**Twelfth Report (Second Biennial) of the State Mineralogist, for the two years ending September 15, 1894, 541 pp., 101 illustrations, 5 maps. J. J. Crawford -----	
**Thirteenth Report (Third Biennial) of the State Mineralogist, for the two years ending September 15, 1896, 726 pp., 93 illustrations, 1 map. J. J. Crawford-----	
Chapters of the State Mineralogist's Report, Biennial Period, 1913-1914, Fletcher Hamilton:	
Mines and Mineral Resources, Amador, Calaveras and Tuolumne Counties, 172 pp., paper -----	.60
Mines and Mineral Resources, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma and Yolo Counties, 208 pp., paper-----	.60
Mines and Mineral Resources, Del Norte, Humboldt and Mendocino Counties, 59 pp., paper -----	.35
**Mines and Mineral Resources, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin and Stanislaus Counties, 220 pp., paper-----	
Mines and Mineral Resources of Imperial and San Diego Counties, 113 pp., paper -----	.50
Mines and Mineral Resources, Shasta, Siskiyou and Trinity Counties, 180 pp., paper -----	.60
Fourteenth Report of the State Mineralogist, for the Biennial Period 1913-1914, Fletcher Hamilton, 1915:	
A General report on the Mines and Mineral Resources of Amador, Calaveras, Tuolumne, Colusa, Glenn, Lake, Marin, Napa, Solano, Sonoma, Yolo, Del Norte, Humboldt, Mendocino, Fresno, Kern, Kings, Madera, Mariposa, Merced, San Joaquin, Stanislaus, San Diego, Imperial, Shasta, Siskiyou and Trinity Counties, 974 pp., 275 illustrations, cloth -----	3.00
Chapters of the State Mineralogist's Report, Biennial Period, 1915-1916, Fletcher Hamilton:	
Mines and Mineral Resources, Alpine, Inyo and Mono Counties, 176 pp., paper -----	.75
Mines and Mineral Resources, Butte, Lassen, Modoc, Sutter and Tehama Counties, 91 pp., paper-----	.55
Mines and Mineral Resources, El Dorado, Placer, Sacramento and Yuba Counties, 198 pp., paper-----	.75



## REPORTS—Continued

Asterisks (\*\*) indicate the publication is out of print.

	Price Postpaid
Mines and Mineral Resources, Monterey, San Benito, San Luis Obispo, Santa Barbara and Ventura Counties, 183 pp., paper-----	\$0.75
Mines and Mineral Resources, Los Angeles, Orange and Riverside Counties, 136 pp., paper-----	.60
Mines and Mineral Resources, San Bernardino and Tulare Counties, 186 pp., paper-----	.75
**Fifteenth Report of the State Mineralogist, for the Biennial Period 1915-1916, Fletcher Hamilton, 1917: A General Report on the Mines and Mineral Resources of Alpine, Inyo, Mono, Butte, Lassen, Modoc, Sutter, Tehama, Placer, Sacramento, Yuba, Los Angeles, Orange, Riverside, San Benito, San Luis Obispo, Santa Barbara, Ventura, San Bernardino and Tulare Counties, 990 pp., 413 illustrations, cloth-----	-----
Chapters of the State Mineralogist's Report, Biennial Period, 1917-1918, Fletcher Hamilton:	
Mines and Mineral Resources of Nevada County, 270 pp., paper-----	.90
Mines and Mineral Resources of Plumas County, 188 pp., paper-----	.60
Mines and Mineral Resources of Sierra County, 144 pp., paper-----	.60
Seventeenth Report of the State Mineralogist, 1920, 'Mining in California during 1920,' Fletcher Hamilton: 562 pp., 71 illustrations, cloth-----	2.00
Eighteenth Report of the State Mineralogist, 1922, 'Mining in California,' Fletcher Hamilton. Chapters published monthly beginning with January, 1922:	
**January, **February, March, April, **May, June, July, August, September, October, November, December, 1922-----	.30
Chapters of Nineteenth Report of the State Mineralogist, 'Mining in California,' Fletcher Hamilton and Lloyd L. Root. January, February, March, September, 1923-----	.30
Chapters of Twentieth Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly. January, April, July, October, 1924, per copy-----	.30
Chapters of Twenty-first Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:	
January, 1925, Mines and Mineral Resources of Sacramento, Monterey and Orange Counties-----	.30
April, 1925, Mines and Mineral Resources of Calaveras, Merced, San Joaquin, Stanislaus and Ventura Counties-----	.30
July, 1925, Mines and Mineral Resources of Del Norte, Humboldt and San Diego Counties-----	.30
October, 1925, Mines and Mineral Resources of Siskiyou, San Luis Obispo and Santa Barbara Counties-----	.30
Chapters of Twenty-second Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:	
January, 1926, Mines and Mineral Resources of Trinity and Santa Cruz Counties-----	.30
April, 1926, Mines and Mineral Resources of Shasta, San Benito and Imperial Counties-----	.35
July, 1926, Mines and Mineral Resources of Marin and Sonoma Counties-----	.30
**October, 1926, Mines and Mineral Resources of El Dorado and Inyo Counties, also report on Minaret District, Madera County-----	-----
Chapters of Twenty-third Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:	
January, 1927, Mines and Mineral Resources of Contra Costa County; Santa Catalina Island-----	.35
April, 1927, Mines and Mineral Resources of Amador and Solano Counties-----	.30
**July, 1927, Mines and Mineral Resources of Placer and Los Angeles Counties-----	-----
October, 1927, Mines and Mineral Resources of Mono County-----	.30
Chapters of Twenty-fourth Report of the State Mineralogist, 'Mining in California,' Lloyd L. Root. Published quarterly:	
January, 1928, Mines and Mineral Resources of Tuolumne County-----	.30

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Asterisks (\*\*) indicate the publication is out of print.

	Price Postpaid
April, 1928, Mines and Mineral Resources of Mariposa County-----	\$0.30
July, 1928, Mines and Mineral Resources of Butte and Tehama Counties	.30
October, 1928, Mines and Mineral Resources of Plumas and Madera Counties -----	.30
Chapters of Twenty-fifth Report of the State Mineralogist, 'Mining in Cali- fornia,' Walter W. Bradley. Published quarterly:	
January, 1929, Mines and Mineral Resources of Lassen, Modoc and Kern Counties; also on Special Placer Machines-----	.35
April, 1929, Mines and Mineral Resources of Sierra, Napa, San Fran- cisco and San Mateo Counties -----	.35
July, 1929, Mines and Mineral Resources of Colusa, Fresno and Lake Counties -----	.35
October, 1929, Mines and Mineral Resources of Glenn, Alameda, Mendo- cino and Riverside Counties-----	.35
Chapters of Twenty-sixth Report of the State Mineralogist, 'Mining in Cali- fornia,' Walter W. Bradley. Published quarterly:	
January, 1930, Mines and Mineral Resources of Santa Clara County; also Barite in California-----	.30
**April, 1930, Mines and Mineral Resources of Nevada County; also Min- eral Paint Materials in California-----	
July, 1930, Mines and Mineral Resources of Yuba and San Bernardino Counties; also Commercial Grinding Plants in California-----	.35
October, 1930, Mines and Mineral Resources of Butte, Kings and Tulare Counties; also Geology of Southwestern Mono County (Preliminary)	.35
Chapters of Twenty-seventh Report of the State Mineralogist, 'Mining in Cali- fornia,' Walter W. Bradley. Published quarterly:	
January, 1931, Preliminary Report of Economic Geology of the Shasta Quadrangle. Beryllium and Beryl. The New Tariff and Nonmetallic Products. Crystalline Talc. Decorative Effects in Concrete-----	.35
April, 1931, Stratigraphy of the Kreyenhagen Shale. Diatoms and Sili- coflagellates of the Kreyenhagen Shale. Foraminifera of the Kreyen- hagen Shale. Geology of Santa Cruz Island-----	.35
**July, 1931. (Yuba, San Bernardino.) Feldspar, Silica, Andalusite and Cyanite Deposits of California. Note on a Deposit of Andalusite in Mono County; its occurrence and chemical importance. Bill creating Trinity and Klamath River Fish and Game District and its effect upon mining -----	
October, 1931. (Alpine.) Geology of the San Jacinto Quadrangle south of San Geronio Pass, California. Notes on Mining Activities in Inyo and Mono Counties in July, 1931-----	.30
Chapters of Twenty-eighth Report of the State Mineralogist, 'Mining in Cali- fornia,' Walter W. Bradley. Published quarterly:	
January, 1932, Economic Mineral Deposits of the San Jacinto Quad- rangle. Geology and Physical Properties of Building Stone from Car- mel Valley. Contributions to the Study of Sediments. Sediments of Monterey Bay. Sanbornite -----	.35
April, 1932. Elementary Placer Mining Methods and Gold Saving Devices. The Pan, Rocker and Sluice Box. Prospecting for Vein Deposits. Bibliography of Placer Mining-----	.35
Abstract from April quarterly: Elementary Placer Mining Methods and Gold Saving Devices. Types of Deposits, Simple Equipment. Special Machines. Dry Washing. Black Sand Treatment. Marketing of Products. Placer Mining Areas. Laws. Prospecting for Quartz Veins. Bibliography (mimeographed)-----	.25
July-October. (Ventura.) Report accompanying Geologic Map of North- ern Sierra Nevada. Fossil Plants in Auriferous Gravels of the Sierra Nevada. Glacial and Associated Stream Deposits of the Sierra Nevada. Jurassic and Cretaceous Divisions in the Knoxville-Shasta Succession of California. Geology of a Part of the Panamint Range. Economic Report of a Part of the Panamint Range. Acquiring Min-	



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ing Claims Through Tax Title. The Biennial Report of State Mineralogist -----	\$0.65
Chapters of Report XXIX, 1933 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:	
January-April. Gold Deposits of the Redding and Weaverville Quadrangles. Geologic Formations of the Redding-Weaverville District, Northern California. Geology of Portions of Del Norte and Siskiyou Counties. Applications of Geology to Civil Engineering. The Lakes of California. Discovery of Piedmontite in the Sierra Nevada. Tracing 'Buried River' Channel Deposits by Geomagnetic Methods. Geologic Map of Redding-Weaverville District, showing gold mines and prospects. Geologic Map showing various mines and prospects of part of Del Norte and Siskiyou Counties-----	.90
July-October. Gold Resources of Kern County. Limestone Deposits of the San Francisco Region. Limestone Weathering and Plant Associations of the San Francisco Region. Booming. Death Valley National Monument, California. Placer Mining Districts, Senate Bill 480. Navigable Waters, Assembly Bill 1543-----	.90
Chapters of Report XXX, 1934 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:	
January. Resurrection of Early Surfaces in the Sierra Nevada. Geology and Mineral Resources of Northeastern Madera County. Geology and Mineral Deposits of Laurel and Convict Basins, Southwestern Mono County. Notes on Sampling as Applied to Gold Quartz Deposits-----	.50
April-July. Elementary Placer Mining in California and Notes on the Milling of Gold Ores-----	.90
October. Current Mining Developments in Northern California. Current Mining Activity in Southern California. Geology and Mineral Resources of the Julian District, San Diego County. Geology and Mineral Resources of Elizabeth Lake Quadrangle. Dry Placers of Northern Mojave Desert. Biennial Report of State Mineralogist. Assessment Work Within Withdrawn Areas-----	.50
Chapters of Report XXXI, 1935 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:	
January. Review of Gold Mining in East-Central, 1934. Current Mining Activities in the San Francisco District with Special Reference to Gold. Geological Investigation of the Clays of Riverside and Orange Counties, Southern California. Information regarding Mining Loans by the Reconstruction Finance Corporation-----	.50
April. A Geologic Section Across the Southern Peninsular Range of California. New Technique Applicable to the Study of Placers. Grubstake Permits -----	.50
July. Mines and Mineral Resources of Siskiyou County (with map). Dams for Hydraulic Mining Debris. Leasing System as Applied to Metal Mining. Mine Financing in California. New Laws Make Radical Change in Mining Rights-----	.50
October. Mines and Mineral Resources of San Luis Obispo County. Mineral Resources of Portions of Monterey and Kings Counties. Mining Activity at Soledad Mountain and Middle Buttes—Mojave District. Kern County. Geology of a Portion of the Perris Block. Southern California. Mineral Resources of a Portion of the Perris Block, Riverside County -----	.50
Chapters of Report XXXII, 1936 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:	
January. Gold Mines of Placer County, including Drag-line Dredges. Geologic Report on Borax Lake, California-----	.50
April. Geology, Mining and Processing of Diatomite at Lompoc, Santa Barbara County. Essentials in Developing and Financing a Prospect into a Mine. Gold-bearing Veins of Meadow Lake District, Nevada County. Semi-Precious Gem Stone Collection in Division Museum--	.50

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July. Mines and Mineral Resources of Calaveras County. Mining in California by Power Shovel. Assessment Work on Mining Claims Within Withdrawn Areas. Joshua Tree National Monument. Cost of Producing Quicksilver at a California Mine in 1931-1932. The Age of Mineral Utilization -----	\$0.50
October. Mineral Resources of Lassen and Modoc Counties. Mechanics of Lone Mountain Landslides, San Francisco. Biennial Report of the State Mineralogist, Properties and Industrial Applications of Opaline Silica -----	.50
Chapters of Report XXXIII, 1937 (quarterly): titled 'California Journal of Mines and Geology,' containing the following:	
January. Source Data of the Geologic Map of California, January, 1937. The Geology of Quicksilver Ore Deposits. Prospecting for Lode Gold -----	.50
April. Mineral Resources of Plumas County, accompanied by Geologic Map of County showing location of Mines -----	.50
Subscription, \$2.00 postpaid in advance (by calendar year only).	
Chapters of State Oil and Gas Supervisor's Report:	
Summary of Operations—California Oil Fields, July, 1918, to March, 1919 (one volume) -----	Free
Summary of Operations—California Oil Fields. Published monthly, beginning April, 1919:	
**April, **May, **June, **July, **August, **September, **October, **November, **December, 1919 -----	
**January, **February, **March, **April, **May, **June, **July, **August, **September, **October, **November, **December, 1920 -----	
**January, **February, **March, **April, **May, **June, **July, August, **September, **October, **November, **December, 1921 -----	Free
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January--February-March, April-May-June, **July-August-September, October-November-December, 1931 -----	Free
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## BULLETINS

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**Bulletin No. 1. Description of Some Desiccated Human Remains, by Winslow Anderson. 1888, 41 pp., 6 illustrations-----	-----
**Bulletin No. 2. Methods of Mine Timbering, by W. H. Storms. 1894, 58 pp., 75 illustrations-----	-----
**Bulletin No. 3. Gas and Petroleum Yielding Formations of Central Valley of California, by W. L. Watts. 1894, 100 pp., 13 illustrations, 4 maps-----	-----
Bulletin No. 4. Catalogue of California Fossils, by J. G. Cooper, 1894, 73 pp., 67 illustrations. (Part I was published in the Seventh Annual Report of the State Mineralogist, 1887)-----	\$0.10
**Bulletin No. 5. The Cyanide Process, 1894, by Dr. A. Scheidel. 140 pp., 46 illustrations-----	-----
**Bulletin No. 6. California Gold Mill Practices, 1895, by E. B. Preston, 85 pp., 46 illustrations-----	-----
**Bulletin No. 7. Mineral Production of California, by Counties, for the year 1894, by Charles G. Yale. Tabulated sheet-----	-----
**Bulletin No. 8. Mineral Production of California, by Counties, for the year 1895, by Charles G. Yale. Tabulated sheet-----	-----
Bulletin No. 9. Mine Drainage, Pumps, etc., by Hans C. Behr. 1896, 210 pp., 206 illustrations-----	.75
Bulletin No. 10. A Bibliography Relating to the Geology, Paleontology and Mineral Resources of California, by Anthony W. Vogdes. 1896, 121 pp.-----	.50
**Bulletin No. 11. Oil and Gas Yielding Formations of Los Angeles, Ventura and Santa Barbara Counties, by W. L. Watts. 1897, 94 pp., 6 maps, 31 illustrations-----	-----
Bulletin No. 12. Mineral Production of California, by Counties, for 1896, by Charles G. Yale. Tabulated sheet-----	.10
**Bulletin No. 13. Mineral Production of California, by Counties, for 1897, by Charles G. Yale. Tabulated sheet-----	-----
**Bulletin No. 14. Mineral Production of California, by Counties, for 1898, by Charles G. Yale-----	-----
**Bulletin No. 15. Map of Oil City Fields, Fresno County, by John H. Means, 1899-----	-----
**Bulletin No. 16. The Genesis of Petroleum and Asphaltum in California, by A. S. Cooper. 1899, 39 pp., 29 illustrations-----	-----
**Bulletin No. 17. Mineral Production of California, by Counties, for 1899, by Charles G. Yale. Tabulated sheet-----	-----
**Bulletin No. 18. Mother Lode Region of California, by W. H. Storms, 1900, 154 pp., 49 illustrations-----	-----
**Bulletin No. 19. Oil and Gas Yielding Formations of California, by W. L. Watts. 1900, 236 pp., 60 illustrations, 8 maps-----	-----
**Bulletin No. 20. Synopsis of General Report of State Mining Bureau, by W. L. Watts. 1901, 21 pp. This bulletin contains a brief statement of the progress of the mineral industry in California for the four years ending December, 1899-----	-----
Bulletin No. 21. Mineral Production of California by Counties, by Charles G. Yale. 1900. Tabulated sheet-----	.10
Bulletin No. 22. Mineral Production of California for Fourteen Years, by Charles G. Yale. 1900. Tabulated sheet-----	.10
Bulletin No. 23. The Copper Resources of California, by P. C. DuBois, F. M. Anderson, J. H. Tibbits and G. A. Tweedy. 1902, 282 pp., 69 illustrations, 9 maps-----	.75
**Bulletin No. 24. The Saline Deposits of California, by G. E. Bailey. 1902, 216 pp., 99 illustrations, 5 maps-----	-----
Bulletin No. 25. Mineral Production of California, by Counties, for 1901, by Charles G. Yale. Tabulated sheet-----	.10
Bulletin No. 26. Mineral Production of California for the Past Fifteen Years, by Charles G. Yale. 1902. Tabulated sheet-----	.10
**Bulletin No. 27. The Quicksilver Resources of California, by William Forstner. 1903, 273 pp., 144 illustrations, 8 maps-----	-----

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Bulletin No. 28. Mineral Production of California for 1902, by Charles G. Yale. Tabulated sheet -----	\$0.10
Bulletin No. 29. Mineral Production of California for Sixteen Years, by Charles G. Yale. 1903. Tabulated sheet -----	.10
**Bulletin No. 30. Bibliography Relating to the Geology, Paleontology and Mineral Resources of California, by A. W. Vogdes. 1903, 290 pp.---	----
**Bulletin No. 31. Chemical Analyses of California Petroleum, by H. N. Cooper. 1904. Tabulated sheet -----	----
**Bulletin No. 32. Production and Use of Petroleum in California, by Paul W. Prutzman. 1904, 230 pp., 116 illustrations, 14 maps -----	----
**Bulletin No. 33. Mineral Production of California, by Counties, for 1903, by Charles G. Yale. Tabulated sheet -----	----
**Bulletin No. 34. Mineral Production of California for Seventeen Years, by Charles G. Yale. 1904. Tabulated sheet -----	----
**Bulletin No. 35. Mines and Minerals of California, by Charles G. Yale. 1904, 55 pp., 20 county maps. Relief map of California -----	----
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Samples (limited to two at one time) of any mineral found in the State may be sent to the Division of Mines for identification, and the same will be classified free of charge. No samples will be determined if received from points outside the State. It must be understood that no assays, or quantitative determinations will be made. Samples should be in lump form if possible, and marked plainly with name of sender on outside of package, etc. No samples will be received unless delivery charges are prepaid. A letter should accompany sample, giving locality where mineral was found and the nature of the information desired.

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